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REPORT

ON THE

EXTENT AND NATURE

OF THE

SANITARY ESTABLISHMENTS

FOR

EUROPEAN TROOPS

IN THE

BENGAL, MADRAS AND BOMBAY PRESIDENCIES.

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PAPERS

RELATIVE TO

SANITARY ESTABLISHMENTS.

From Major G. HUTCHINSON, Officiating Secretary to Government, Punjaub, Military Department, to the Secretary to the Government of India, Military Department, —(No. 82, dated Lahore, the 27th February 1861.)

No. 952, dated 16th February 1860.
No. 806, dated 3rd April 1860.

I AM directed to reply to your letters marginally cited, regarding Sanataria for the European Troops in the Punjaub.

2. The printed correspondence which accompanied your communication was circulated to Civil and Medical Officers, and reports were called for.

3. With a few exceptions the reports received do not afford more information of the localities treated of than is to be found in the printed papers above referred to. For facility of reference, I am directed to forward a brief abstract of the correspondence.

4. The Hon'ble the Lieutenant-Governor desires here to remark that, with reference to the state of the finances, there seems no urgent necessity for increasing the number of depôts, as the accommodation already existing has not, it is believed, been found inadequate to the wants of the Troops.

5. With exception to the Lahore division, the Troops in the Punjaub are amply provided for. For the Lahore division, comprising the important stations of Meean Meer, Mooltan, Ferozepore, and Sealkote, it would be desirable to have a depôt more conveniently placed than Kussowlie and Dugshaie. Dalhousie is well situated to meet this want; it seems singularly well adapted for a convalescent depôt, and

is stated to possess many advantages over some of the existing Sanataria. His Honor would therefore suggest, that the original intention to form a depôt there be carried out when the finances admit of it.

P. S.—For the further information of Government, I am to forward the reports in original, as follows :—Their return is solicited when no longer required.

From Commissioner, Trans-Sutlej, with annexments from Dr. Parker, and Deputy Commissioner, Kangra.

From Commissioner and Superintendent, Cis-Sutlej States, dated 9th June 1860.

From Commissioner and Superintendent, Cis-Sutlej States, dated 30th June 1860.

From Commissioner and Superintendent, Rawul Pindee Division, dated 10th July 1860.

From Commissioner and Superintendent, Mooltan Division, dated 25th July 1860.

From the Officiating Judicial Commissioner, Punjaub, dated 13th July 1860.

From Civil Assistant Surgeon, Murree, dated 4th August 1860, with report.

From Chief Engineer, Punjaub, dated 29th October 1860, with enclosures.

ABSTRACT OF REPORTS ON SANATARIA.

Remarks on suitability of Dalhousie as a Sanatory Depôt.

Judicial Commissioner, Mr. Roberts.

Dalhousie.

It is easy of access and would prove a boon to the European Soldiery and European communities of Lahore, Umritsur, Ferozepore, and Sealkote. Describes the air as fine and dry—scenery beautiful—water abundant and of good quality.

Mentions Kuror as likely to make an excellent Sanatarium for invalids for whom the altitude of Murree is considered too great. It is 18 miles east of Rawul Pindee—distant 20 miles from Murree—4,200 feet above the sea level—and was formerly occupied as a cantonment by the Sikhs.

Officiating Financial Commissioner, Mr. Cust.

Cannot afford any information on the subject.

Commissioner Dehli, Mr. Brandreth.

There are no Sanataria or suitable places for them in his division—appends a report by the Civil Surgeon on the character of the soil, water, and prevailing diseases of Dehli.

Commissioner, Cis Sutlej, Mr. Barnes.

There are three depôts in his Division, *viz.* Kussowlie, Dugshaie, and Subathoo—they are not occupied to the full extent the accommodation will admit of. Besides these stations there are numerous sites yet available, these are Bunasir—5,200 feet high—easy of access—water abundant—and well wooded;—the Chewa and Choonjur ridges near Dugshaie on the new road—elevation 6,000 feet—water abundant from the Thibet road tunnel. Further on the same road is Solun—sites for Troops abundant—elevation between 5,000 and 6,000. Water, stones, lime, and some kinds of timber plentiful.

Cheni.

In reply to the reference regarding Cheni, Mr. Barnes states, that without going to the spot and making observations he could not give a *full* report on the place; but refers to the description given by Doctor Grant in the printed report on Sanataria, who resided there during the hot season of 1850. It is an open plateau nearly 10,000 feet above the sea level: the plateau is broad, accessible to breezes from every side, sprinkled with trees—it is 14 marches or 150 miles from Simla—up to the tenth march there is the Thibet road with Bungalows at convenient distances—it is passable from May to November—beyond that stage there is no proper road, merely a pathway.

Scenery.

Cheni lies amongst lofty snow-clad mountains which have a marked effect on the climate. The mean temperature during the hot weather and rains at Simla is 68,° while at Cheni during the same period it did not exceed 55.° In the periodical rains when the usual fall at Simla is 60 or 65 inches, the fall at Cheni has been estimated at less than 10 inches. Water is most plentiful, rills and springs abound in every part of the plateau, and it is believed to be of good quality. Cannot speak as to the prevailing winds and diseases. States that there can be no doubt that Cheni, in its dry, elastic, and temperate climate, offers advantages not attainable any

where else in India: as for many classes of diseases it would prove quite as beneficial as a voyage to sea, to Australia, or England. On the other hand Cheni is remote, not easy of access—supplies are scarce, and the road lies through foreign though tributary states. Supplies for Troops would have to be transported from the plains at a great outlay, and with these drawbacks questions the expediency of establishing a Sanatarium there.

Commissioner, Trans-Sutlej, Mr. Melville.

There are two Sanataria in this division, viz., Dhurmsalla and Dalhousie.

Deputy Commissioner, Kangra, Mr. Saunders.

Dhurmsalla or Bhagsoo is nearly 6,000 feet above the sea level; it is easy of access, being 136 miles from Lahore, 73 from Hoshearpore, 97 from Jullundur; and there are barracks with the necessary out-offices, hospitals, and quarters for Officers. It is an excessively rainy place, and is much confined. Mr. Melville is of opinion it is in no way suited for a convalescent depôt; he would retain the existing barracks, but would not add to the accommodation there.

Dalhousie.—Barracks have not been erected at this place; but the spur originally set aside for barracks is 5,700 feet high, admirably situated, being sufficiently near the sites assigned for private buildings, and yet separated from them. There is ample space for the men to roam about, and for places of recreation. It is as easy of access as Dhurmsalla, and presents fewer obstacles to the construction of a good road—the distance from Lahore is 139 miles, from Sealkote 119—water is abundant and of good quality, lime, stone, slate, and building material are plentiful. The fall of rain during the monsoon is moderate, and two chalybeate springs are said to exist there. Mr. Melville is of opinion that Dalhousie possesses great advantages as a Sanatarium over Kussowlie, Dhurmsalla, Subathoo, and Dugshaie.

Commissioner, Lahore, Mr. Forsyth.

Unable to furnish any report, as there are no hills in his division.

Commissioner, Mooltan, Colonel Hamilton.

There are no hill stations in the division; but forwards a report by the senior Medical Officer, suggesting that for many classes of diseases the coast Sanatarium of Ghizree, near Kurrachee, might be resorted to. The steamers afford easy access to the depôt.

Reports on Murree as the only Sanatarium in his division :—information relating to this station is more fully given in the printed correspondence sent by the supreme Government. The supply of water is of good quality but scanty ; but measures are in progress for diminishing the inconvenience experienced in this respect. The convalescents have few sources of amusement and recreation. Suggests that a covered skittle alley be constructed, that a reading room or club house be provided for the men, and that they be encouraged to play cricket at the Flats, a level grassy spot some two and a half miles distant from the barracks. Offers remarks relating to the prevailing diseases, and the steps adopted to ensure a proper supply of vegetables to the convalescents.

Commissioner, Rawul Pindee, Captain Pollock.

There are political objections to the formation of Sanataria in any of the hills on the border. In upper Huzara there are numerous ranges affording excellent sites, but much the same in point of elevation, soil, scenery, supply of water, &c., as Murree. But with Murree, established, so much easier of access to the Troops throughout the division than any of the available sites would be, there seems, in his opinion, no necessity for another depôt. Appends a letter from the Deputy Commissioner, Huzara, reporting on the capabilities of Abbottabad as a Sanatarium. Captain Adams states that while Abbottabad may be considered a healthy station for a small European cantonment, it is altogether unsuited for a Sanatarium by reason of its low altitude and being surrounded by hills.

Commissioner, Peshawur, Captain James.

Dr. Bellew.

Reports at some length on Murree. Topographical notice.

Murree.

Is situated on the summit of one of the many mountain ridges, which emanating from the Cashmere portion of the Himalayan range, terminates on the plain between the rivers Indus and Jhelum, and which are known as the Huzara hills. Its height above the sea is about 8,000 feet, and it extends for 3 miles along the irregular crest of the hill, at a distance of about 18 miles from the river Jhelum, which for a short distance flows along the northern base of the hill.

Note.—Believed to be not more than 7,300.

The station contains between 90 or 100 houses, exclusive of the convalescent barracks, which occupy an eminence near its centre, and the adjoining slope of the hill.

CHARACTER OF THE SOIL.

The ridge of hill is composed of a grey calcareous sandstone rock, which is believed to be non-fossiliferous. In many parts it is covered by a layer of indurated clay; in some places of a red, in others of a yellow color. On higher parts of the hill, where vegetation is profuse, the surface is more or less covered by a layer of black vegetable mould.

ACCESSIBILITY.

The station is approached from Rawul Pindee, the nearest Military station, by an excellent road 38 miles long, and which, for more than half its length winds through most charming scenery; the ascent is gradual, and camels can with ease travel to the top of the hills. A Military road to Abbottabad (Huzara) is in course of construction, and there are besides some district roads, of which one leads to Dewal Thanna, the first march to Cashmere, and another to Kotti towards the Jhelum.

CHARACTER OF THE SCENERY.

The scenery in the immediate neighbourhood of Murree is peculiar; it cannot be considered grand or majestic, neither uninteresting; it possesses a quiet Sub-Alpine character, which exercises a beneficial effect on the invalid arriving from the plains. Murree may be described as in the midst of a sea of hills, which are for the most part well wooded, especially on their northern slopes, and much resembling each other in their general contour. The forest, clothing these hills, are composed chiefly of firs and pines, several varieties of oaks, the horsechesnut, walnut, sycamore, hawthorn, coloneastes, Indian fig, kawala, acacia, and many other handsome trees. Among shrubs the most conspicuous in point of frequency are the rhododendron, rose, clematis, jasmine, barbery, the common bair (zizyphus), wild indigo, &c.—on the lower heights, dwarf acacia, mimosa and olive, euphorbias and a great variety of leguminous plants—on the higher elevations several varieties of ferns, orchids, crocuses, violets, saxifrage. The wild animals comprise the tiger, leopard, hyena, wolf, jackal, fox, wild cat, &c—the bear, wild hog, barking deer, and troops of monkeys range the forests—birds exist in great variety, and of brilliant plumage.

CLIMATE AND PREVAILING WINDS.

The year may be said to consist of the winter, spring, summer with its rains, and autumn seasons. Winter usually sets in about the middle of December with a fall of snow, which continues to fall at intervals till the end of February. This season is not so severe as an English winter. The air, except on occasions of stormy weather when a keen east wind prevails, is clear, bracing, and health inspiring, and is calculated to improve such constitutions as are free from organic disease, but are suffering from general debility and want of tone of the nervous system, produced by a more or less prolonged residence in the relaxing climate of the plains. The Natives during this season suffer much from inflammatory affections of the lungs and its membranes. Last winter the district was visited by a severe epidemic, typhoid fever, which caused considerable mortality, as many as 70 deaths from this cause in one village having been reported at the Tahsil. The villages near the Sanatarium also suffered, but not to so great an extent, as the sufferers had the benefit of medicines and advice from the charitable dispensary.

Spring sets in early in March with frequent storms of sleet, hail, and rain, followed by a period of fine sunny weather, during which crocuses, violets, and other spring flowers come into bloom. During April the air is mild and balmy and occasional showers fall. Trees and shrubs now begin to bud. In May the weather becomes warm and the trees have completed their foliage and flowering. Intermittent and continued fevers are prevalent amongst the Natives at this season, principally, however, amongst those inhabiting the low valleys at the foot of the hills, in which situations the circulation of the air by winds is not as free as at the summits of the hills, and consequently admits of a stagnation of the exhalations from the soil.

The summer and rainy season extends from the commencement of June to the middle of September. June is the hottest month of the year and generally dry. The sun's rays are powerful, and often the atmosphere is densely hazy. In this month the corn crops ripen, and the wheat and barley harvests are gathered. The rains usually commence towards the close of June, and continue till the middle of September. The aggregate fall of rain during this season ranges between 28 or 30 inches; that for the whole year ranging between

48 and 50 inches. Bowel complaints, rheumatism, and fevers are the prevalent diseases during this season. And most organic viseral diseases, such as pulmonary, hepatic, and intestinal affections of a chronic inflammatory nature, which, during the spring progress favorably, now become worse, and, in severe cases, unless early removed to a better climate, terminate fatally. All such cases, on the approach of the rains should be removed; and I do not know of a better or more convenient site than the neighbouring cantonment of Rawul Pindee, which is easy of access, naturally well drained and freely ventilated, and during this season comparatively cool, and yet free from the continued and excessive moisture of the atmosphere that prevails at the hill top.

The rainy season at all the Sub-Himalayan Sanataria appears to be the most unhealthy portion of the year.. At Murree, however, it is comparatively less so than at any of the others, and this is attributable to the fact of its geographical position, placing this Sanatarium almost beyond the influence of the monsoon (S. E.) which, by the time that it has reached thus far north, becomes pretty nearly exhausted, having already parted with most of its rain and moisture to the hills further south and east in increased proportion to their proximity to the sea coast. It is owing to this mild character of the rainy season at Murree that the peculiar form of diarrhœa so prevalent at other Sub-Himalayan Sanataria, which are more under the influence of the monsoon, is so little noticed here.

The autumn is usually a fine season, and is considered the healthiest portion of the year. At first the weather is somewhat rainy, afterwards the air becomes clear and mild, and towards the close of the season is cold and invigorating; clouds now gather and a fall of snow announces the arrival of winter, and this is usually about the middle of December. The prevalent winds are easterly and north-easterly during the winter and spring months; during the summer the prevalent winds are from the west or north-west in fine weather, and from the south or south-east in stormy or rainy weather. During the winter and spring months the clouds generally travel down towards the plains, but in the rainy season their direction is reversed (they usually come up from the plains;) in the former case the winds blowing from the north or north-east, and in the latter from the south or south-east.

Chief Engineer.

Remarks as follows on the stations noted.

Some medical men have considered that the altitude is too great, and that Soldiers sent to a hill climate in a weak state of health require a lower and more sheltered site. This Sir J. Lawrence considered a mistake,—the choice sites of the Civil station being still higher, and no place can be more dry, healthy, and pleasant for a hill climate during the rains than Murree.

Murree.

I remember however to have heard, during my tours of inspection to Darjeeling, the same complaint regarding the site of the convalescent depôt there; it is 500 feet higher than the station, and consequently the fall of rain is greater than in the station—the mist not less, and wind and lightning much more—snow and hail lie longer on the ground, and often fall when there is none in the station—the cold is greater.

From the memorandum given in the printed papers, it will be seen that the death rate has, notwithstanding these objections, been much lower at Darjeeling than either at Landour or Murree.

The Superintending Engineer, 2nd Circle, Captain Hutchinson, states that Kussowlie, Dugshaie, and Subathoo are the most accessible Sanataria in his circle, being only from 40 to 50 miles from the nearest large Military station of Umballa; they are connected with each other by cart roads, and Kussowlie by the direct mule track, is only 9 miles from Kalka at the foot of the hills.

Dalhousie is more distant from a large Military station, but can be made very readily accessible for the Troops at Lahore, Umritsur, Jullundur, and Sealkote.

Dalhousie is not so densely wooded as Simla or Murree, but is open to the breezes from the snows or from the plains. Level space is much wanting at all these stations for such amusements as foot balls and cricket. He thinks Dalhousie would have the advantage in this respect over all the other hill stations, the slopes and sides of the hill being less abrupt.

The supply of water at Simla and Kussowlie is scanty and of inferior quality—at Dhurmsalla and Dalhousie a plentiful supply of water might be obtained at small cost.

At Subathoo, the least healthy of the hill stations, 3 upper story barracks have lately been completed and occupied, affording excellent accommodation for 300 men.

In regard to means of providing amusement and occupation for the men, more might certainly be done at Murree, by converting all the available ground in the immediate vicinity of the barracks into smooth terraces and walks, with inexpensive rustic seats placed round trunks of trees or in other convenient spots. I pointed this out to the Superintending and Executive Engineers in my late visit to that station, and directed that provision should be made in the annual estimates for making good foot paths and roads round the barracks, and steps to the doors.

More might in this way be made of the ground round barracks at all Sanataria, and it would add much to the comfort, convenience, and amusement of the men.

From R. PARKER, Esq., M. D., Civil Assistant Surgeon, Dhurmsalla, to Major G. HUTCHINSON, Officiating Secretary to Government, Punjaub, Military Department,—(No. 2, dated Dhurmsalla, the 2nd July 1860.)

I HAVE the honor to acknowledge the receipt of your letter No. 3604, and to answer the points therein requiring definite notice. In my answer to your letter No. 3022, of 25th May, I answered nearly all the questions as well as I could.

1*st.* The character of the soil at Dhurmsalla is that of a red and grey clay, covered with a sandy soil in most places, and a black vegetable mould in others. It lies over sandstone rocks, which occasionally come to the surface, and it contains a great quantity of stones and boulders of sandstone. The sandstone from its softness, and being easily worked, is used for building purposes; but from its porousness buildings of it are liable to be damp.

Owing to the sandy nature of the soil, and the natural drainage of the station, water never lodges, and after the heaviest rains the ground will be perfectly dry in 2 or 3 days. I believe this may account in a great measure for the immunity the station is said to possess over other hill stations from diarrhœa and such diseases.

2*nd.* The station is easily accessible from the plains either *viâ* Jullundur, distant 97 miles, or Umritsur 100 miles. Both the roads from

the above places are good, and hackeries can travel by them up to the Kotwalee, at the lower end of the station. Camels can ascend the hill, and can go to most of the houses of the residents, or at all events to the upper bazar

3rd. *Character of the scenery.*—The scenery is very fine, having from all parts of the upper station a fine view of the Kangra valley, and from the lower part and middle of the station a magnificent view of the snowy range. The station is well timbered with oak and rhododendron trees, which afford shade from the sun in most places, and a pretty foliage. Roads about the station are numerous and in good order, affording easy access from one part of the station to another.

4th. In my last report, I said that there were no gardens for Soldiers; I find in that I was mistaken. There is a garden, now used by the residents of the station, which originally, I am given to understand, was made for the benefit of the Soldiers. In the event of any men being sent to the depôt, there are no means of amusement or occupation for them, beyond that of simply taking walking exercise.

5th. The supply of water is derived from springs and streams fed by the drainage from the high range. The supply is sufficient for household purposes, but not for irrigation. The quality of the water from many of the springs is good and very palatable. Some of the streams running down the station are said to contain traces of iron.

6th. The prevailing winds seem to be easterly and westerly, south-easterly and westerly. The winds are sometimes during a storm, very violent, but generally speaking the atmosphere is very quiet, hardly a ruffle on the trees throughout the day.

7th. Having been but a short time in the station, I cannot, I regret, state from personal knowledge much about the prevailing diseases incidental to the position. No endemic disease has occurred during my sojourn here. The upper part of the station is above the influence of malaria; at the lower part of the station in the Jail and Police Lines, cases do at times occur. Smallpox is endemic in the valley, and of course cases may take place at or in any part of the station.

8th. Coughs and bronchial attacks amongst natives of a severe form are common, during the rainy and winter months. Diarrhœa also occurs during the rainy season, but it is not generally of that intractable form

in which it makes its appearance at Kussowlie and Simla. This as I said before, may be accounted for by the sandy porous soil and good drainage of the station. Cholera was epidemic in the valley in 1857, and a few cases happened up here. Rheumatic cases are said, as in other hill stations, not to be benefited in the least by a residence here. Children so far as I have seen, seem to thrive very well here.

The climate is not nearly so bracing or invigorating as that of Murree, but it seems at least in this season to agree both with European and Native constitutions well.

From R. PARKER, Esq., M. D., Civil Assistant Surgeon, Dhurmsalla, to Major G. HUTCHINSON, Officiating Secretary to Government, Punjaub, Military Department,—(No. 1, dated Dhurmsalla, the 9th June 1860.)

I HAVE the honor to acknowledge the receipt of letter No. 952, from the Secretary to Government of India, to Secretary to Government of Punjaub, on the subject of sanatory establishments, and memorandum No. 3022, calling for report on the subject.

1. "Dhurmsalla" is distant from Lahore 136 miles; Jullundur 97. The roads from both these places are good, so that accession is easy. The station is situated on a ridge descending from the main range of the Himalayas, which rise immediately behind to a height of 16,000 feet. The houses are chiefly built on the eastern and western slopes of the ridge at an elevation varying from 4 to 6,000 feet above the level of the sea.

2. The supply of water is derived from springs arising in the higher range. The quality is good, and the quantity sufficient for household purposes.

3. The station is well wooded with the white oak, rhododendron tree—a variety of English trees grow in the neighbourhood—the horsechesnut, maple, walnut, elm. During the rainy season the hills, I believe, are covered with ferns, grasses, flowers, and mosses—potatoes thrive well on the slopes of the hill; they are planted in March and gathered in November.

4. The soil consists of grey and red clays, mixed with, in places, disintegrated sandstone and granite. It lies over blue and grey sandstone rock, and contains a great number of stones and bou lders of sandstone and granite. The sandstone is used for building purposes; and from its softness and porousness, the buildings in which it is used, are

liable to be very damp during the rainy season. From the natural slopes of the station, and from the porous nature of the soil, the drainage is very good; and even in the worst weather, I believe, water lodges but for a short time.

5. Barracks have been erected capable of containing 30 or 35 men—their situation is good and open, on a point of the western end of the station—the natural drainage is very good. They consist of 2 barracks with 2 cook-rooms, and latrines, a hospital with cook-room, and dead house, an apothecary's house, a commissariat Serjeant's house, and godown, and quarters for the Commanding and Medical Officers. The cook-rooms and latrines are well apart from the barracks, and from each other. The barracks are built of sandstone, with slated and planked roofs. They are well ventilated but not well lighted.

Each barrack consists of one long room, partly divided into three by a wall;—at the end of each three are two rooms for married people or Serjeants.

At present the barracks are unoccupied.

6. The climate of "Dhurmsalla" is reputed to be good. The spring is pleasant enough certainly; but the climate does not appear to me to be nearly so bracing or invigorating as that of Murree. The rainy season commences about the latter end of June, and from the position of the station, with the Himalayan range rising immediately behind it to a great height, and upon which all the clouds of the monsoon collect and break, that season lasts longer and is severer than that of other hill stations. 79 inches of rain have fallen in one month alone I believe. From the excessive moisture of the atmosphere and sudden changes from heat, the climate cannot be good during the rainy season, for men suffering from bowel or hepatic complaints, but in that respect all hill stations at that time of the year are bad. Rheumatic and pectoral complaints are not likely to be benefited by it either. I have been but a short time in the station, and cannot from my own knowledge say much on the endemic diseases of the station and district. I see many men affected with goitre, who I believe chiefly live in the valley and use snow water, or water impregnated with calcareous particles, for drinking purposes. The Kangra valley at this time of the year is flooded for rice cultivated: that combined with the amount of rain that will fall during the ordinary rainy season, will be, I

should think, later on in the season most conducive to malaria. It is believed that nothing more is wanted to produce malaria than a water absorbing surface—that this surface should be well soaked and then dried—that the higher the temperature and the quicker the drying process, the more plentiful and violent, will be the malarious poison emanated. All these requirements the Kangra valley has every season to its utmost. The elevation of the station is too high to allow of its being affected by any malaria from the valley.

7. Dalhousie and Holta or the neighbourhood of Holta, are the only other localities near here adapted for Sanataria. Accession to them, I believe, is not easy.

In selecting sites for Sanataria, a great object of course would be to get beyond the influences of the rains; but as that, from the distances and difficulty of access, is as yet impossible, localities in my opinion, should be preferred in good open positions at elevations between 6 and 7000 feet above the level of the sea. Sanataria at lower elevations do not afford that amount of cool air and bracing atmosphere so requisite for men worn out by fevers and prostrated by the depressing effects of the high temperature of the plains; of course as mentioned in para. 6, a residence at such an elevation would not be likely to benefit—but the reverse—men suffering from bowel, rheumatic, and some pectoral complaints, but these again are cases not likely to be benefited by a residence in any hill climate, and which would derive more benefit from a sojourn in a good healthy station at a moderate elevation, such as 2000 feet above the level of the sea; Rawul Pindee for instance, the healthiest station I know in India.

It would of course be very desirable, that at every Sanataria there should be Soldiers' gardens, skittle grounds, &c. Without amusement and exercise the men of course will not improve, and exercise simply as exercise in the way of walking, men will not take much of, without compulsion. "Dhurmsalla" at present has no means of affording amusement or exercise to the men stationed there. I regret that every information on the subject called for should be so every scant. I have only been a few weeks in the station, and have no experience derived from a residence in any other hill stations.

From R. SAUNDERS, Esq., Deputy Commissioner, Kangra, to the Commissioner and Superintendent, Trans-Sutlej States,—(No. $\frac{589}{266}$, dated Dhurmsalla, the 2nd June 1860.)

UNDER your docket No. $\frac{267}{1255}$, dated 29th instant, I have received copy of Punjaub Government No. 3014, dated 25th instant, calling for a report on the subject of Sanataria for European Troops in India.

Localities.

2. There are three favorable spots for Sanataria in the Kangra district, the first at Dalhousie, the second at Dhurmsalla, and the third at Holta.

3. Of these three, the most accessible at present is Dhurmsalla, after that Holta, then Dalhousie.

Distances.

The distance of Dhurmsalla from Lahore is 136 miles, from Hoshearpore 73, from Jullundur 97.

The distance of Holta from Dhurmsalla is 22 miles. The distance of Dalhousie from Lahore is 139 miles, and from Sealkote 119.

Present condition.

4. It is impossible to say which of the three is the most healthy.

5. At Dhurmsalla, barracks have been actually built; at Dalhousie, they have only been projected; and Holta has not yet been thought of.

Height.

6. The spot selected for a convalescent depôt at Dalhousie is 5,700 feet above the level of the sea; the barracks at Dhurmsalla are something less than 6,000, and the height of Holta is only 4,500 feet.

Capabilities.

7. Good slates for roofing are procurable at each of these localities, but by far the finest are to be met with at Dalhousie.

8. At each place there are plenty of level sites for building; and wood, water, stone, and lime, are to be found in abundance.

9. Two chalybeate springs are said to exist at Dalhousie impregnated with sulphur as well as iron; and if as good as they are reported they would indeed be invaluable for remedial purposes.

Geology.

10. The soil of the Kangra district is composed principally of tertiary sandstone and of rotten granite, the component parts of which are probably

quartz, felspar, and mica. Marl, conglomerate limestone, and clayslate are also found in the neighbourhood of Dhurmsalla and Holta, and the conglomeration is usually in brecciated masses.

Meteorology.

11. At each of the spots named, storms are of very frequent occurrence.

12. The nearest rain guage to Holta, distant about six miles from the tea factory, registered 120·83 inches during 1858-9, and 66 inches during 1859-60; and the fall of rain at Dhurmsalla during the same year was 156·96 and 121·18. I am not in possession of meteorological observations with regard to Dalhousie.

Prevailing diseases.

13. The prevailing complaints of the district are fever and bowel complaint—goitre too is not uncommon; the first two complaints are principally confined to spots of less elevation than Holta. The lowlands under rice cultivation are most exposed to malaria, and this chiefly when the rains are subsiding.

Their cause.

14. Great authorities, I have heard, differ as to the real active causes of malaria. Some assert that noisome gases, such as carbonic acid and sulphurated hydrogen are generated from extensive tracts of bare and rocky ground. Humboldt attributed the frequent occurrence of epidemic illness in the monasteries of South America, to the existence of large tracts of barren rock in their neighbourhood. The Delhi fever is supposed too by many to owe its origin to the bare and rocky ridge above cantonments,—a ridge famous now in the page of history for the deeds of British valour that it witnessed in 1857.

Instances on record.

15. I have read too that a fearful and fatal epidemic haunts the rocky heights of Spain near Teneriffe; and the "Modorra," which is the name it goes by, is attributed to very similar causes.

Another cause.

16. Regular opinion, however, attributes the actual cause of miasma to the decomposition of organic matter. Noxious vapors arise from spots once saturated with water but dried up by the sun; and animal and vegetable substances thus moistened by the rain, would be more than ever liable to decomposition, particularly when subjected to a high degree of temperature.

17. It is this that breeds such a pestilence in Italy—it this that devastates the rice producing districts in the valley of the Po—and what but this gives the fever so common in the Kangra plains.

Instances.

18. If the theory of the gases be really true, then fever would be found more prevalent at Holta and Dhurmsalla than at Dalhousie, for these places are for the most part under a precipitous range of barren rock, nor am I not prepared to say that it is not so.

Fever.

19. But the fact is, I believe admitted, that dense forests and low brushwood are the reverse of healthy : for this reason Simla would be less healthy than other places, and the deadly atmosphere of the Terai, especially by night, is quite proverbial. There the circulation of the air would be confined, and the evaporation from the foliage and fallen leaves would be copious, consequently the existence of carbonic acid in large quantities would be unavoidable, and the oxygen of air would be destroyed.

20. I would therefore prefer the middle course, and select for Sanataria good open localities not higher than 6,000 or lower than 4,000 feet above the level of the sea—sufficient forest land, not to avoid the theory of the gases, and not too much to run the risk of malaria. The elevation of the places I propose fall within these limits.

Best position for Sanataria.

21. But we must guard against dysentery and diarrhœa as much as against fever.

Bowel complaints—their cause.

22. Altitude may be good as a fever preventive, but it is not indispensable for bowel complaints.

23. These depend mainly on the great alteration of temperature. Sudden night chills are the common causes. Great heat at day and heavy dews at night, a wide range of the thermometer between 12 at noon and 12 at night, and want of proper clothing,—these are the causes in nine cases out of ten.

The effects are similar to those produced by the Sirocco or Levanter and I do not know that they are more fatal at these three places than they are at any other.

18 111

24. As regards facility of communication there is an excellent road from Hoshearpore to Dhurmsalla, with five good Bungalows and five pukka Seraies along it.

Accessibility.

25. Detachments of 50 to 100 men can always be provided for at these halting places. The road to Holta is tolerable, but wants bridges. A good road from Noorpore to Holta like that to Hoshearpore is greatly wanted, and will in all probability be shortly made.

Roads and Seraies.

26. On the whole, I should call Holta and Dhurmsalla certainly accessible, but Dalhousie capable of being made so.

27. At this last place, accommodation for 100 sick* men or more might be obtained, and perhaps 300 at Dhurmsalla and Holta, allowing space for the erection of racket courts, skittle grounds, cricket fields gymnasium; and other places of recreation. tea, too, might be profitably planted and superintended by the invalids on Government waste lands, which encircle these depôts,—and trades might be carried on profitably.

Accommodation for Troops.

* I believe 300 invalids are the greatest number sent to the hills in the Lahore Division.

Places of amusement and recreation.

28. I would suggest that a company or part of a company of the Royal Sappers and Miners, sick or not sick, be sent to Kangra and placed at the disposal of the district Officer. With their assistance much might be done, both in providing accommodation for coming Troops and in opening out the district communications every where. Their labor would cost nothing to Government, and their skill might be turned to good account. Improvements, such as saw mills to be driven by water power, could be started in several places. Boring operations for coal might be conducted successfully, and mechanical appliances could be introduced for the more efficient working of the Mundi salt and iron mines,—and above all bridges. The great want of this district might be provided cheaply and expeditiously, and thus render the Sanataria more than ever accessible for European Troops,

Suggestions.

Employment of Sappers and Miners.

On Roads.

Boring.

Mines.

29. The Muzbee Pioneers under the direction of a few English Sappers would be almost as useful in providing house-room for Troops in these three Sanataria.

Muzbee Pioneers.

30. I am ready to provide more than the accommodation I have stated, should Government approve of my suggestions; and if the work is entrusted to me, it shall be done for 75 per cent. less than the lowest estimate of the Public Works Department.

From P. S. MELVILLE, Esq., Officiating Commissioner and Superintendent, Trans-Sutlej States, to the Military Secretary to Government, Punjaub,—(No. 86, dated Dhurmsalla, the 21st June 1860.)

As directed in your docket No. 3014, dated 25th ultimo, I have the honor to report on the Sanataria of this division. Copy of a letter from the Deputy Commissioner of Kangra, No. 266, dated 2nd instant, on the same subject, is herewith forwarded.

2. I possess no scientific knowledge, and there fore can give no opinion on the geology, or the hygienic peculiarities of the different stations, but there are broad facts patent to any observer; and evidence as to the healthiness of the various places is given in the printed correspondence that accompanied your docket under reply.

3. In this division there are two Sanataria, Dhurmsalla and Dalhousie; Mr. Saunders names a third, Holta, but this is a mere settlement in the Palum valley, and though undoubtedly a healthy place, it cannot be regarded as suitable for the location of Troops, inasmuch as there is no accumulation of residents, nor is there any Civil or Military post in the neighbourhood. A dozen equally healthy places might be found in the Kangra and Palum valleys.

4. Of Dhurmsalla and Dalhousie I would unquestionably select the latter. There is no appreciable difference in the accessibility of either from the town of Puthankote, to which point soldiers from the Punjaub must come. It is four marches to Dhurmsalla, and the same to Dalhousie. Were the road to Dalhousie widened, probably the advantage in accessibility would rest with it: and it must be remembered that the line from Puthankote to Dalhousie crosses no stream of any magnitude, whereas the entire line from Puthankote to Dhurmsalla is intersected by streams

of the most dangerous character in the monsoon. But Dalhousie has two immense advantages over Dhurmsalla; it does not receive nearly so much rain, and being composed of open ridges and surrounded on all sides by passable and unprecipitous hills, it offers greater means of recreation. Dhurmsalla is an excessively rainy place, and is moreover much confined. It lies in an angle of the great Chumba range, which offers a complete barrier.

5. It would perhaps be well to keep the few convalescents that the barracks are capable of holding at Dhurmsalla; but Dhurmsalla does not seem to me to be a place in any way suited for the location of Troops. Dalhousie is eminently adapted for this purpose. The spur originally set aside for the barracks, at an elevation of about 5,700 feet, is admirably situated, being sufficiently near the spurs devoted to private residences, and yet separated from them. There is ample space for the men to roam about and amuse themselves; and competent testimony goes to prove that the rains are moderate, and that, therefore, the liability to bowel disease will not probably be great. Dalhousie seems to me a more appropriate site for a Sanatarium than Dhurmsalla, Kussowlie, Subathoo, or Dugshaie.

From G. C. Barnes Esq., Commissioner and Superintendent, Cis-Sutlej States, to Major G. Hutchinson, Officiating Military Secretary to Government, Punjaub,—(No. 101, dated Kussowlie, the 9th June 1860.)

I have the honor to reply to your docket No. 3015, dated 25th May, regarding stations in the hills for the location of European Troops.

2. You are aware that three already exist in the Cis-Sutlej territory, Kussowlie, Subathoo, and Dugshaie. These are not occupied to the full extent the accommodation will admit. At Kussowlie there are barracks in an incomplete state, which, if finished, would accommodate an entire Regiment. At present the only use made of the station is for a convalescent depôt, containing about 250 Soldiers from various Regiments in the neighbourhood.

3. Besides these three stations there are numerous sites still unoccupied, on which new barracks could be erected. First I would mention the hill of "Bunassir." The elevation of this hill is about 5,200 feet. It contains an abundant supply of water, about 1,000 feet below the crest of the hill. The hill is composed of sandstone which makes excellent

building material. Lime is abundant. The "pinus longifolia" grows to a great size, and covers both the crest and the northern slopes of the hill. A mountain stream only divides it from Kussowlie; and a branch road could be easily constructed from the Umballah and Kalka roads at Pinjore. Bunassir was the private residence of Sir G. Clerk, Major Broadfoot, and Major Mackeson, successively Political Agents on the Frontier. It is situated in Putteealla, and we should have to exchange other territory for it.

4. The new carriage road up to Simla from the plains has opened up many advantageous sites. The first of these are the "Chewa" and "Choonjur" ridges, close to Dugshaie. The crest of the hill is about 6,000 feet, or the same nearly as Dugshaie and Kussowlie. The commenced excavation of a tunnel for the passage of the Thibet and Hindoostan road, has opened out a permanent supply of water on either side of this hill, more than sufficient for the supply of a Regiment. Stone and lime are abundant. This hill is less wooded, but good timber must all come from the Mahassoo forest near Simla. This hill also I believe belongs to Putteealla.

5. Further on the some road is the Tahsil station of Solhun, where there are abundant sites for the location of Troops. The elevation exceeds 5,000 feet and is less than 6,000 feet. Water, stone, lime, and some species of timber are abundant.

6. There is a report on some of these sites by Lieutenant Colonel Boileau of the Engineers, dated 18th December 1846, forwarded through Lieutenant-Colonel Benson, Military Secretary to Lord Hardinge, which I dare say is forthcoming amongst the records of the Supreme Government. But this letter contains most of the information in a condensed form.

From G. C. Barnes, Esq., Commissioner and Superintendent Cis-Sutlej States, to the Military Secretary to Government, Punjaub,—(No. 120, dated Kussowlie, the 30th June 1860.)

In reply to your letter No. 3599, dated 23rd June, regarding the capabilities of Chini in Kunawur as a Sanatarium for European Troops, I beg to refer you to page 44 of the printed papers. There you will find about the best notice procurable of the climate and advantages of Chini, drawn up by Doctor A. Grant, Surgeon to His Excellency the Marquis of Dalhousie, Governor General, who resided during the hot weather and rains of 1850 A. D. at that place. Without going to the

spot and making deliberate observations, extending over many months, I could not hope to give a better account of its climate than is given by Doctor Grant.

Character of soil.

2. Chini is situated about 1,500 or 2,000 feet above the bed of the Sutlej on an open plateau, at an elevation of 9096 feet above the level of the sea. The plateau is broad, accessible to breezes from every side, sprinkled with trees, and laid out in terraced cultivation, consisting for the most part of wheat, barley, buckwheat and other cereals. The surface is not irrigated. The climate allows of only one crop in the year, and the genial showers that fall, combined with the low temperature, are sufficient to mature the crops without artificial irrigation. The precise character of the soil I do not exactly know, but it is light and porous, certainly not hard and clayey.

Accessibility.

3. Chini is fourteen marches, say 150 miles from Simla, which again is four marches itself from the plains. Altogether the distance from the plains cannot be much less than 200 miles. As far as Surahun, the tenth march from Simla, there is the Thibet and Hindoostan road with Bungalows at convenient distances of ten miles apart. Up to this point the road though narrow and unfit at present for carts, is level and good. It is passable only from May to November on account of the high elevation at which it runs and the depth of snow. From Surahun the real difficulties begin. The road is quite unfit for ponies; nothing but sheep and goats and human beings can travel. The hill ponies do occasionally come along this route, but their loads have to be taken off, and at certain places they are swung up or down over almost perpendicular cliffs by ropes. There are no Bungalows, and all throughout the route supplies are exceedingly scarce. The country grows scarcely enough grain for its own consumption, and is quite incapable of sustaining for any length of time any material addition to the population. Grain is imported from Gurhwal on the east, and is also brought up from Rampore by the Sutlej. Every thing required for the Soldiers,—tea, sugar, potatoes, meat, beer, grain of all sorts for camp followers, oil, clarified butter, &c., &c., would have to be brought the whole way with them.

Character of scenery.

4. I have given a general description of the scenery. Chini lies amongst lofty hills, all culminating in snow. Behind the village the slopes ascend by gradual steps to the

limits of perpetual snow, and in front across the Sutlej are colossal mountains, precipitous, and clothed with everlasting snows. The presence of these fields of ice has a marked effect on the climate. The mean temperature during the hot weather and rains at Simla is 68°, and at Chini during the same months the average did not exceed 55°.

Means of providing occupation, &c., for the men.

5. The climate would undoubtedly admit of much more out-of-door exercise for the men than at Simla. I believe at that elevation and temperature the sun would be quite innocuous. But there would be danger of great monotony for the men, unless amply provided with books, ball alleys, and cricket implements. Even then their limited number and their remote situation would be irksome to them.

Supply of water, &c.

6. Water is most plentiful and close to. In every part of the plateau I have seen rills and springs. I am not certain of the quality, but it cannot be otherwise than good. Any spring percolating from the ground through a light porous soil will be pure and agreeable. It is only surface-water, and springs on clayey soils, that contain hurtful matter.

Prevailing winds.

7. I cannot say what are the prevailing winds, but violent storms are unusual. I should think that the course of the winds would be naturally up or down the river Sutlej, which would be north-east and south-west. The fall of rain and snows may be computed at about 25 to 30 inches a year. In the periodical rains, when the usual fall at Simla is 60 or 65 inches, the fall at Chini has been estimated at less than 10 inches.

Prevailing diseases.

8. On this point again, I am sorry to say, I can add nothing to the information Government may possess. But I should think that the notes of Dr. Grant must contain information on the subject. The climate of Chini has proved highly beneficial in all cases of intestinal ailment. Cases of dysentery and severe bowel complaint have yielded to the dry elastic climate of the place, which has proved as beneficial as a voyage to sea. Dr. Grant recommends Chini for all chronic and obstinate diseases, especially for patients of scrofulous habit. The only exceptions he makes, are for diseases of the heart or lungs, when perhaps the rarified atmosphere would be too stimulating and aggravate the disease. It is fair therefore to suppose, that fever, dysentery, and such like diseases are not endemic; but that pulmonary complaints are more likely to prevail.

9. Lastly, I beg to apologize for the naturally imperfect character of these remarks. I know something of Chini and Kunawur, and I could better trust myself to write on the subject than to refer to others. There can be no doubt that Chini in its dry, elastic, and temperate climate, offers advantages not attainable any where else in India. Many patients would regain health there, whom nothing else would save but a voyage to Australia or England. On the other hand, Chini is very remote and almost inaccessible as a Sanatarium—its climate though very bracing and tonic is of limited duration—supplies are not procurable—every thing must be carried there from Simla or the plains. Until the Thibet road is completed, the carriage will be very expensive and difficult—large stores would have to be kept in reserve in case of accidents. The men might just as well be out of India, for in that remote position they would not be considered available for any emergency. Chini, moreover, is situated in the territories of the Rajah of Bunahir. The road leading there passes entirely through foreign though tributary states. All these are great drawbacks. The ordinary climate of our established Sanataria has been found sufficiently restoring for most patients. It is only a limited number that could benefit by going to Chini; and it becomes a question whether such cases should not rather be sent to England at once.

10. The peculiar advantage of Chini is its freedom from the periodical rains. This advantage is enjoyed by other localities separated from the monsoon winds by a range of mountains sufficiently high to catch the rain-charged clouds. For instance, in the Kangra district, the country called *Burmore,* on the northern face of the Chumba range, immediately above Dhurmsalla, is even more dry, and the temperature quite as elastic as Chini. It is true that a chain of mountains not less than 15,000 feet above the sea has to be surmounted; but the distance from our possessions and markets is less than half the distance from Simla to Chini, indeed, not more than a fourth or 40 miles from Dhurmsalla. Again, this region could be made more accessible by crossing the range at a lower point towards the west, though the distance would be increased. I do not mean to say that a Sanatarium in Burmore is advisable ; but I would point out that the advantages of Chini might possibly be secured nearer.

From J. W. Brown Esq., Officiating Commissioner and Superintendent, Rawul Pindee Division, to the Military Secretary to Government, Punjaub,—(No. 111, dated Murree, the 9th July 1860.)

I am now able to reply to your No. 3594, dated 23rd ultimo, calling attention to No. 3010, dated 23rd May 1860, which forwarded a report on the sanatory establishments of India, and called for one on Murree.

2. Taking up the subject as directed in your letter, I have first to report on—

Indian Annals, October 1854.

The character of the soil.—I learn that "the strata of the hills are composed principally of calcareous sandstone, with grit and red sandy shale, dipping towards the east with varying declinations." The soil itself is a rich black mould overlying red or grey clay, which here and there itself forms the surface. It has been pronounced by Colonel Burnett, an authority of weight, unsuited for the growth of tea; and in this opinion Captain Babbage, who, from a residence in Assam has become acquainted with the subject, fully coincides. Experiments, however, are in progress, and a final report will ere long be submitted. I anticipate no success after Colonel Burnett's verdict that tea cannot be grown where snow lies on the ground.

Barakow Dâk Bungalow	12 miles
Seela Seraie ...	5½
Tret Dâk Bungalow ...	6½
Goragullee Tower ...	8
Murree Barracks ...	7½
	39½

3. *Its accessibility.*—In this respect, I believe, Murree must rank very high as a Sanatarium, situated at short 40 miles from Rawul Pindee (*vide* route in margin), approached by a road, the greater part of which could be traversed by wheeled carriages, and the whole of which is excellently suited for baggage animals including camels, and which in no place passes through an unhealthy belt of jungle. I imagine that no Sanatarium can boast of equal advantages on this head. The road is still being improved, several bridges are in course of construction, and an important work, a masonry bridge over the Leh stream, will, it is hoped, be completed during the ensuing cold weather. Half the cost of construction has been offered by Abdool Rahman the public spirited contractor. Plan and estimate have been submitted.

Character of the scenery.—Passing at the foot of the hills through a belt of low jungle, the lower hills are seen covered with low shrubs* and under-growth. As we ascend, the variety of the vegetation is beautiful and marked, changing every mile as we recede from the plains. The Murree hill itself is beautifully wooded—for varieties of trees *vide* margin. The *flora* is considered more European than at any other of the hill stations, and I believe contains more of the European natural orders. The valleys and faces of the hills are well cultivated. Much of the surface now occupied by buildings was formerly under cultivation, principally Indian Corn. The French bean grew up its stalks—the crops produced in the valleys are wheat, barley, dal, Indian corn, millet, onions, kuddoo, kukree, &c.—rice much cultivated at lowest elvations, but of an inferior description—potatoes are grown in and round the station, and each year the cultivation increases; but I cannot from my own experience speak highly of the quality—good seed might with great advantage be imported—Furruckabad seed is most valued—north and west sides of the hills are generally well wooded—the south and east sides being grassy and comparatively bare, or used for cultivation.

* The Phullae (acacia modista) is an exception to this.

Oak, Pines, Excelsa, Pinus Webbiana, white and black, varieties of Hawthorn, Ash, Ilex, Hazel, Birdcherry, Larch, Horsechesnut, Walnut, Sycamore, Rhododendron (a little below Murree), Willow.

4. *Means of providing amusement and occupation for the men.*—These are rather wanting, owing to the confined space occupied by the cantonment. The snow lies so long on the ground that a garden has to be re-made each season; and it must be confessed that to find occupation and amusement for the depôt convalescents is not an easy matter. A skittle ground might be made near the barracks, covered in so as to be available during the rains. Quoits have been supplied, I believe, and I think the men should be not only allowed but encouraged to go as far as "the Flats" for cricket and bowls. Here as elsewhere much can be dône in the way of supplying books, papers, and periodicals; and the Revd. Mr. Gell's plan adopted so successfully at Poona, might be introduced, viz., having a humble kind of club, self-supporting and managed by the Non Commissioned Officers, where the men could read, smoke, and purchase at small cost, coffee, tea lemonade, biscuits, &c.

5. *Supply of water and its quality.*—Quality good—supply limited—so that, as I write, inconvenience is experienced ; the subject however has attracted His Honor's attention, and measures are being adopted which will ensure an abundant supply in future seasons, provided that the authorities guard against all felling of timber and clearing away of under-wood, where this would affect the springs we have to rely on. I mention this because I am told, that owing to the want of such precautions, our older Sanataria are getting worse off year by year, and are occasionally put to great straits for water : and we should profit by their experience.

6. *Prevailing winds.*—From April to September they generally follow the line of the hills north-east and south-east, north-west and south-west. In October and November, and probably through the winter, winds are more northerly.

7. *Prevailing diseases incidental to the position, both as regards Europeans and Natives, adults and children.*—On this head I have only been prevented from consulting Dr. Bellew, Civil Surgeon, from an understanding that he is submitting a separate report agreeably to your circular. A Medical Officer of great experience and formerly in medical charge here informs me as follows :—"The diseases occurring at the depôt are so modified by the various ailments of the convalescents sent up, that no accurate view can be given of any diseases incidental to Murree itself. Every hill station of this elevation, however subject to daily, and often great atmospheric changes, cold night winds during the summer months, and cold humidity during the rainy season, must favor a predisposition to catarrhal affections and internal congestion, both of the bowels and lungs, or diseases traceable to diminished or impeded functions of the liver and skin. The diarrhœa formerly so prevalent in the Simla hills, has hardly ever been met with, neither do I think the low type of fever which occurs in a few cases yearly at Simla, is ever met with at Murree in so grave a form. Much of the sickness at the older hill stations arose from defective sanatory arrangements, and consequent pollution of the atmosphere. In a smaller and more recent station such causes should not be allowed to gather strength.

"Children are peculiarly liable to be affected by the often sudden changes in days and seasons, and unless great care be taken, are sure to suffer catarrhs ; chest and bowel complaints will therefore always be liable to occur—and parents do not always pay sufficient attention to

dress and hours, keeping up "plain" habits and clothing in a climate of such an elevation, which has greater daily varieties of temperature and more moisture at certain seasons than Europe.

" Natives of the plains suffer much, especially during the rainy season, from rheumatism, fever, and bowel complaints, boils, abscesses, skin diseases." The above remarks appear to me sound and to the purpose. I would add, that the native population appears to suffer very much from intermittent fever. They live, however, low down in the valleys within the influence of malaria; and I have seldom or never seen a race more generally sickly in appearance. They are however reported to be hardy, and I have no reason for believing them to be short lived. Their diseases may partly be caused by insufficiency of food and clothing, and the inferior quality of the former (chiefly Indian corn and millett.)

They suffer also to a large extent from small pox; and the Medical Officers at Murree have exerted themselves meritoriously in extending vaccination.

8. Murree has a severe winter, and the rainy season entails great inconvenience on residents. The actual fall is said to be less than at Simla or Mussooree, but the soil is more clayey and dries more slowly.

9. The cholera visitation of 1858 has been fully reported on. It came from the direction of Cashmere, and has not been known to attack Murree either before or since, and cannot be considered a drawback to the station—1858 was an exceptional year—none of the hill stations have, I believe, enjoyed a perfect immunity from this scourge.

10. The above remarks contain little or nothing original, but may be considered of value, as bringing together some interesting statistics connected with the station: and I beg to send herewith for perusal, to be returned when done with, a copy of the Indian Annals referred to at commencement of report, and which reflects credit on the research and observation of the writer.

11. The subject is hardly within my province, but I would draw attention to a fact asserted at page 134 of the above report, that " numbers of unsuitable cases are sent to the depôt."

The remark was made six years ago, and it is to be hoped that the experience gained in the interim has led to great improvements in this respect.

12. Lastly I would remark, that at present the bazar is very poorly supplied with vegetables; and that I am in correspondence with the Commissariat, and have a project in hand for making over a garden at Chutter, rent free, to a native to grow vegetables for the station.

From the Commissioner and Superintendent, Mooltan Division, to the Military Secretary to the Punjaub Government, Lahore,—(No. 124, dated Mooltan, the 25th July 1860.)

WITH reference to your letter No. 3017, of the 25th May, I have the honor to observe that as there are no Sanataria in this division, report on that subject is unnecessary. The transmission of convalescents from the Troops at this station to the Sanataria is, however, a matter deserving consideration; and I accordingly addressed the Brigadier commanding at Mooltan on that subject, in my letter No. 103, of the 29th idem, but I have not yet received a reply.

From the Commissioner and Superintendent, Mooltan Division, to the Secretary to Government Punjaub, Military Department, Lahore,—(No. 130, dated the 27th July 1860.)

IN continuation of No. 124 of the 25th instant, transmits memorandum in original by Doctor Macintire on the subject of Sanataria, for the information of His Honor the Lieutenant-Governor.

Memorandum in reference to letter No. 952D, of the 16th of May 1860, from the Supreme Government, to the Government of the Punjaub, calling for information on the subject of Sanataria.

THERE being no place at or near Mooltan adapted for a Sanatarium, about three years ago I suggested that an experiment should be made of sending European Soldiers from this and other stations in the Punjaub to the coast Sanatarium of Gizree near Kurrachee, to which the steamers on the Indus afford ready access at most seasons of the year. Many men have been sent from here in consequence, but owing to the change of Corps, no reliable records of the exact result have been obtained. I have seen enough, however, in my own practice and that of other

Medical Officers to enable me to state that, if due care is taken in the selection of cases, much benefit will be derived from this Sanatarium. I have every reason to believe that many cases which derive no benefit from the hills, do well at Gizree. Children, however, are said not to do well, and pulmonary disease, scurvy, ulcers, and syphilitic *eruptions*, I have seen return in no way improved. Cases of debility after fever with a tendency to bowel complaint, seem to do well, so also do rheumatism (either ordinary or syphilitic), head affections, incipient spinal disease, and struma. Hepatic disease I am doubtful about; but bowel complaints seem to do better than in the hills. During the hot months cases occur which it would be desirable to send to the hills, but for the difficulty and danger of the present means of travelling in that direction at such a season. Sooner however than keep them here, they are sent to Gizree and get on pretty well. The completion of the railway to Lahore, will, in a considerable measure, change this state of things, and place the Corps at Mooltan and other stations in the Punjaub in a very advantageous position for disposing of such of their sick as require change of climate.

(Signed) J. MACINTIRE, *Surgeon-Major,*
Sanatory Officer.

MOOLTAN,
The 24th July 1860.

From A. A. ROBERTS, Esq. C. B., Officiating Judicial Commissioner, Punjaub, to Major G. HUTCHINSON, Officiating Military Secretary to Government, Punjaub, Lahore,—(No. 2653, dated Lahore, the 13th July 1860.)

I HAVE the honor to acknowledge the receipt of your letters Nos. 3008 and 3593, dated respectively the 25th May and 23rd June, requesting certain information in regard to the Sanataria of the Punjaub.

2. The only hill station which seems to call for notice is Dalhousie, and I regret that I am not able to give any information regarding it from personal knowledge; but I have been assured by General Windham, the Reverend Mr. Sloggett, and Captain Perkins,

who have recently visited it, and the last of whom is now there, that it promises to make an excellent Sanatarium. It is situated only 150 miles from Lahore, at the head of the Baree Doab—access is most easy at all times, even in the rains, as the road lies along the water shed of the country, and no stream of any sort intervenes. The air is described as fine and dry, the scenery as most agreeable, and there is said to be an abundant supply of good water: four or five families are now up there. I think that temporary sheds might be constructed and a party of 50 invalid and convalescent Soldiers might be sent up there in the month of August, to remain till the end of October. A Sanatarium at Dalhousie would be a great boon to the European Soldiery, and to the European communities of Lahore, Umritsur, Ferozepore, and Sealkote, and also to some minor stations.

3. I would also draw the attention of Government to a place called Kuror, about 18 miles east of Rawul Pindee. It is visible from Murree, from which place it is distant about 20 miles. It is a fine Table Land, some 4,200 feet above the level of the sea—there are wells on it. The Sikhs had a cantonment there, and I rather think it was once occupied by some Troops or Levies under Colonel Abbott. I think it would make an excellent Sanatarium for those cases for which the altitude of Murree is considered too great. I mentioned Kuror to Major General Sir Sydney Cotton, last year, and also to Dr. Deakin of the Murree medical depôt, who has, I believe, visited the place, and is probably prepared to express an opinion regarding it.

From Dr. H. W. Bellew, Civil Assistant Surgeon, Murree, to Major G. Hutchinson, Officiating Secretary to Government, Punjaub, Military Department,—(dated Murree, the 4th August 1860.)

In reply to your letter No. 3603, dated 23rd June 1860, and agreeably to the instructions therein contained, I have the honor now to forward enclosed reports on the Murree Sanatarium.

REPORT ON MURREE SANATARIUM.

Topographical Notice.

Murree Sanatarium is situated on the summit of one of the many mountain ridges, which emanating from the Kashmir portion of the Himalayan range, terminate on the plain between the rivers Indus and Jhelum, and which are known as the Hazara Hills. The station is in north latitude and in east longitude; its height above the sea is computed at about 7,300 feet, and it extends for upwards of 3 miles along the irregular crest of the hill, at a distance of about 18 miles from the river Jhelum, which for a short distance flows along the northern base of the hill.

The station contains between 90 and 100 houses, exclusive of the convalescent barracks, which occupy an eminence near its centre and the adjoining portion of the western slope of the hill. I am unable to furnish any particulars regarding this portion of the station, as it is under the medical charge of a separate professional Officer. With respect to the rest, however, a few notes may not be out of place here. The houses are for the most part not well built. The majority leak more or less during the rains; and from the fact of green timber being used in their first construction, the doors and windows are far from air tight, and consequently admit draughts of air at numerous cracks and crevices. As regards the construction of roofs, I am glad to note an improvement, the old single mud roofs being in many instances replaced by double roofs, the outer of which is usually formed of wooden shingles.

The station generally is excellently drained; and this naturally owing to the favorable formation of the surface. The growth of trees and brushwood, but the latter especially, is in some parts excessive, and might with advantage be considerably thinned. At present it serves as a screen for the refuse matter and filth of the neighbourhood, and in the rainy season moreover it holds a considerable amount of moisture, and thus intensifies and prolongs the dampness of the atmosphere around.

With respect to conservancy arrangements, last year, I believe, a set of rules were framed with a view to keeping the station clean and pure, and it was proposed to erect latrines at different parts of the station. These arrangements have been carried out as regards the bazar, below which, at a convenient distance, sites have been marked off for

this purpose. But owing to the want of proper superintendence, great difficulty has been experienced in getting the Natives to resort to these places; and the bazar and its purlieus are still far from as clean as could be desired, though owing to the activity of the Native Commissioner in this matter, a great improvement has of late taken place. With a view to the strict observance of cleanliness in this important part of the station, and an amelioration of its present unsatisfactory sanatory condition, I would beg to submit the following suggestions, *viz.*, that a sufficient staff of sweepers, under a " Jemadar" of their own caste, be entertained from the 1st April to 30th November of each year: during this period their services would be most needed, and also most easily procured.

That their duty shall be to sweep the bazar, streets, and alleys, every morning and evening, and to convey all refuse matter and filth found within the bazar limits to an appointed site at a safe and convenient distance.

That their wages be paid from the bazar fund or other available source.

That they be placed under the direct supervision and control of the Kotwal, who shall be held responsible for the due performance of their duties.

I cannot too strongly urge the importance and necessity of some such arrangements being speedily adopted. For in the bazar, above all other parts of the station, are the favoring agencies in the production and fostering of disease, found most concentrated. Hence it is that the spread of contagious and infectious diseases (not always epidemics) through a station is often traced to its first appearance in the bazar. A due consideration and appreciation of these circumstances, will, without further explanation on my part, shew the imperative necessity for the strict enforcement of sanatory measures and regulations in the station generally, and in this part of it especially.

CHARACTER OF THE SOIL.

The ridge of hill on which Murree is situated is composed of a grey calcareous sandstone rock, which is, I believe, non-fossiliferous. In many parts it is covered by a layer of indurated clay which is in some places of a red, and in others, of a yellow color. The surface soil derives its character from these indurated clays being mostly composed of their disintegrated materials; and on the higher parts of the hill, and especially in those localities where vegetation is profuse, the surface is more or less covered by a layer of black humus or vegetable mould, the result of the decay of vegetable organic matter. Such are the main geological characters of Murree hill. Those lying to its east possess much the same character, but those on the west are composed of limestone rock which meets the Murree sandstone at Goragulli and Kuldhana,—at both of these sites the surface is covered with a stiff clay which is more or less impregnated with gypsum; this salt shewing on the surface in crystallized veins of greater or less extent. The foregoing remarks apply chiefly to the higher parts of the Murree hill. At lower elevations the sandstone is more exposed, and consequently, owing to its disintegration, the soil in such localities is of a more sandy nature than at the higher parts of the hill.

ACCESSIBILITY.

Murree is approached from Rawul Pindee, the nearest Military station, by an excellent road 38 miles long, and which for more than half its length winds through most charming scenery. The ascent is very gradual, and camels can with ease travel to the top of the hill. This is the only road connecting Murree with the plains. A Military road connecting this station with the Military station of Abbottabad is now in course of construction. There are besides some distinct roads, of which one leads to Dewal Thanna (the first march towards Kashmir) and another to Kotli and Kahrita villages towards the river Jhelum.

In anticipation of the probable extention of this station, or the selection of sites for new Sanataria in its neighbourhood, I would here beg to submit the following remarks. The ridge of hill on which Murree is situated is one of three principal spurs which coalesce at

a central eminence known as Topah hill. The rough sketch herewith affixed will convey a better idea of the local relations of the places hereafter mentioned, than any description I can give. The spur marked Dewal hill, on account of the village and Thanna of that name being situated on it, commences at the river Jhelum, and runs a course from north by east to south by west for about 16 miles, when it meets the other two spurs at Topah hill. From this eminence the other two spurs run southwards, and are only separated from each other by a deep gorge. Of these spurs, that on which Murree is situated, is by far the most extensive, and branches out into numerous low ridges, some of which run across the termination of the spur to be now described, and which on the sketch is marked Ariari hill, on account of a village of that name on the upper part if its western slope. Ariari hill extends from Topah hill south by east for about 12 miles, when it is separated from low hills—off shoots running eastward from the Murree spur—by a small mountain stream which rises in the go rge between the Murree and Ariari hills, and afterwards joining other similar streams forms the river Soan a tributary of the river Indus. The Murree spur extends south-west from Topah hill for about 20 miles when it terminates in low ridges on the plain at a distance of about 10 miles from Rawul Pindee. This is the highest and most extensive of the three spurs. It is moreover the most uneven and precipitous, possessing much less level surface than the other two spurs. Its highest part which is also that nearest to Topah hill, is occupied by the Murree Sanatarium. Its easy accessibility from the plains has been already described—and that of the other two spurs is equally so—for the Kashmir road, which with a few improvements would form an excellent one, passes from Murree along the crest of Dewal hill as far as the Thanna of that name; and the Kotli road, one similar to that of Kashmir, passes over the crest of the Ariari hill at a distance of about 8 miles from Murree station. There is another and a considerably shorter route by which Ariari hill might be reached from Rawul Pindee. From this station to the village of Augari there is already a rough camel road. Augari is a small village on a low hill opposite to the termination of Ariari hill at the little stream already mentioned as arising between the Murree and Ariari spurs, and forming the river Soan, after joining other mountain streams. From this point onwards to the summit of Ariari hill, I know of no road, but believe that one could be made without difficulty, the surface apparently offering no serious obstacles; on the

contrary, the western slope of this spur presents a much more even aspect than either slope of the Murree spur. In addition I need only add, that the various qualifications that render the Murree spur a suitable site for a Sanatarium, exist to an equal extent on the Dewal and Ariari spurs, formerly a portion of the Dewal spur, known as the Flats, used to be occupied during the season by a Detachment of Native Troops. Their subsequent removal to a site nearer the station was owing, as far as I can learn, to circumstances of a political nature only.

CHARACTER OF THE SCENERY.

The scenery in the immediate neighbourhood of Murree is peculiar. It cannot be considered grand or majestic, neither can it be called uninteresting; on the contrary it possesses a quiet Sub-Alpine character, which exercises a charming and very beneficial effect on the invalid arriving from the plains. Murree itself may be described as in the midst of a sea of hills, which are for the most part well wooded, especially on their northern slopes, and much resemble each other in their general contour. The prospect towards the north and north-east is backed in the distance by the magnificent, snowy range of Kashmir, whilst towards the south, in striking contrast, the extensive plain of the Indus bounds the horizon. The view nearer the station is very pleasant, and the varied hues of the foliage and surface blending together relieve the eye of fatigue, and deprive the hills around of an otherwise monotonous character.

The forests clothing these hills are composed chiefly of firs and pines (species of abies and pinus) with on the higher elevations, the deodar (cedrus deodron), several varieties of oaks, the horsechesnut, walnut, sycamore, hawthorn, cotoneaster, Indian fig, kawala, acacia, and many other handsome trees, with whose names I am not acquainted, are common. Among shrubs, the most conspicuous in point of frequency, are the rhododendron, rose, clematis, jasmine, barbery, the common bair (zizyphus), wild indigo, rest-harrow (ononis) &c., &c. On the lower heights are found various species of dwarf acacia, mimosa, and olive, also euphorbias, and a great variety of leguminous plants. On the higher elevations, ferns, (of which there are several species) orchids, crocuses,

violets, saxifrages, are common, as also a vast variety of other herbs. This vegetation, the character of which I have just attempted to describe, affords shelter and sustenance to a great variety of quadrupeds, birds, and insects. Of the first, the chief are the tiger, leopard, hyena, wolf, jackal, fox, wild cat, &c.—the bear, wild hog, barking deer, porcupine, &c.,—troops of monkeys also range the forests. Birds exist in great variety, and many of the species possess very brilliant plumage. Of the varieties of the different species to be met with, I can convey no adequate idea. The golden eagle and hawk, together with others of allied species, soar about the higher elevations. The forests teem with thrushes, orioles, chats, fanoctees, robins, tits, kinglets, and finches, parrots, woodpeckers, pheasants, and a vast variety of other species whose food consists of the insects, fruits, and grains with which the forests abound. The open brushwood swarms with partridges (grey, black, and grecian), and quails in their season are plentiful.

MEANS OF PROVIDING AMUSEMENT AND OCCUPATION FOR THE MEN.

The character of the surface at Murree does not admit of any flat ground at a convenient distance from the barracks being appropriated as a garden or play ground for the use of the Soldiers at the convalescent depôt. In default of this means of amusement and occupation, or even as an adjunct where such is available, I believe that the establishment of a Soldier's club, on the principle of a mechanics institute, would prove an advantageous source of occupation, amusement, and improvement to the men. The institution might consist of three departments, *viz.*, library, gymnasium, and laboratory. The last named should be provided with the implements of the various mechanical trades and arts, such as carpentering, sculpturing, boot and shoe and saddlery making, tailoring, &c.; and the men should be encouraged to work at these by a fair remuneration for their labour. And this they would be sure to realize were it known to the general European community that they could supply their wants, on the instances indicated, from such a source. The bane of the Soldier's life in this country is the absence of any sti-

mulus, apart from his Military duties, to exercise either mental or bodily; whilst the restraint necessarily exercised over him in his present position produces, or at least greatly favors the apathy and listlessness which too often leads to dissipation and recklessness of its consequences, and this in many instances from sheer want of profitable or amusing employment. From want of experience with European Troops in this country, I am unable to adduce any facts or statistics favoring any particular plan or proposition for adoption under this head; but will content myself with reiterating the well known fact, that the idleness of the Soldier's life in this country is one of the very greatest disadvantages attending his residence in it; and earnestly hope that those qualified to do so may draw out some feasible plan for the remedy of this great evil.

SUPPLY OF WATER AND ITS QUALITY.

The supply of water at Murree, though generally sufficient for the ordinary wants of the population, is not found in great abundance. Its source is solely from springs which are numerous and distributed all over the hill. Many of these, however, in the hot weather, become exhausted, and then a considerable scarcity of water is experienced. The springs of small size, and which are not sheltered by vegetation, are the first to dry up, whilst during the hot months, the supply from all becomes greatly diminished. The inconvenience resulting from this circumstance could be obviated by the construction of masonry reservoirs at the sites of the different springs all along the crest of the hill, in which positions the tanks would be free from the risk of pollution by the drainage from higher ground, which would prove an objection were they situated lower down the slope of the hill.

With regard to the quality of the water, as taken from the spring, it is clear and well tasting, but it yields a more or less abundant precipitate with nitrate of silver, thus indicating the presence in solution of cholride of calcium, which communicates to the water its quality of hardness. The water as taken at a distance from the issuing of the spring on the surface, is more or less tainted with decomposed vegetable matter, and other impurtiies derived from the soil

it flows over or percolates through. The natives (especially casual visitors,)—and they are generally good judges in this matter—since they always form an opinion of the salubrity or otherwise of a place from the quality of its water, pronounce that of Murree to be inferior, and consider it a frequent cause of colic and other affections of the bowels. When filtered, however, the water is deprived of most of its deleterious qualities, and is rendered wholesome. And this practice is, I believe, very generally pursued by the European residents of the station.

CLIMATE AND PREVAILING WINDS.

I regret my inability to supply any correct data of the meteorological changes at Murree by means of a synoptical table of the variations of temperature, &c., owing to the absence of instruments for noting the same at the Murree dispensary. I trust, however, that the following brief notes will be found to convey a tolerably correct idea of the climate at this Sanatarium. The year may be said to consist of the winter, spring, summer with its rains, and autumn season. Winter usually sets in about the middle of December with a fall of snow, which continues to fall at intervals till the end of February. This season is not so severe as an English winter. The air, except on occasions of stormy weather when a keen east wind prevails, is clear, bracing, and health inspiring, and is calculated to improve such constitutions as are free from organic disease, but are suffering from general debility and a want of tone of the nervous system, produced by a more or less prolonged residence in the relaxing climate of the plains. The Natives during this season suffer much from inflammatory affections of the lungs and its membranes. Last winter the district was visited by a severe epidemic typhoid fever, which caused considerable mortality; as many as 70 deaths from this cause in one village having been reported at the Tahsil. The villages near the Sanatarium also suffered, but not to so great an extent, as the sufferers had the benefit of medicines and advice from the charitable dispensary.

Spring sets in early in March with frequent storms of sleet, hail, and rain, followed by a period of fine sunny weather, during which cro-

cuses, violets, and other spring flowers come into bloom. During April the air is mild and balmy and occasional showers fall. Trees and shrubs now begin to bud. In May the weather becomes warm, and the trees have completed their foliage and flowering. Intermittent and continued fevers are prevalent amongst the Natives, at this season, principally, however, amongst those inhabiting the low valleys at the foot of the hill, in which situations the circulation of the air by winds is not as free as at the summits of the hills, and consequently admits of a stagnation of the exhalations from the soil.

The summer and rainy season extends from the commencement of June to the middle of September. June is the hottest month of the year and generally dry. The sun's rays are powerful and often the atmosphere is densely hazy. In this month the corn crops ripen, and the wheat and barley harvests are gathered. The rains usually commence towards the close of June and continue till the middle of September. The aggregate fall of rain during this season ranges between 28 and 30 inches, that for the whole year ranging between 48 and 50 inches. Bowel complaints, rheumatism, and fevers are the prevalent diseases during this season; and most organic visceral diseases, such as pulmonary, hepatic, and intestinal affections of a chronic inflammatory nature, which during the spring progress favorably, now become worse; and in severe cases, unless early removed to a better climate, terminate fatally. All such cases, on the approach of the rains, should be removed, and I do not know of a better or more convenient site than the neighbouring cantonment of Rawul Pindee, which is easy of access, naturally well drained and freely ventilated, and during this season conparatively cool, and yet free from the continued and excessive moisture of the atmosphere that previls at the hill top.

The rainy season at all the Sub-Himalayan Sanataria appears to be the most unhealthy portion of the year. At Murree, however, it is comparatively less, more so than at any of the others, and this is attributable to the fact of its geographical position, placing this Sanatarium almost beyond the influence of the monsoon (S. E.), which, by the time that it has reached thus far north, becomes partly nearly exhausted, having already parted with most of its rain and moisture to the hills further south and east, in increased proportion to their proximity to the sea coast. It is owing to this mild character of the seasons at Murree that the peculiar form of diarrhœa so prevalent at other Sub-

Himalayan Sanataria, which are more under the influence of the monsoon, is so little noticed here.

The autumn is usually a fine season and is considered the healthiest portion of the year. At first the weather is somewhat rainy, afterwards the air becomes clear and mild, and towards the close of the season is cold and invigorating ; clouds now gather, and a fall of snow announces the arrival of winter, and this is usually about the middle of December. The prevalent winds are easterly and north-easterly during the winter and spring months. During the summer, the prevalent winds are from the west or north-west in fine weather, and from the south or south-east in stormy or rainy weather. During the winter and spring months, the clouds generally travel down towards the plains ; but in the rainy season their direction is reversed ; they usually come up from the plains ; in the former case the winds blowing from the north or north-east, and in the latter from the south or south-east.

PREVAILING DISEASES INCIDENTAL TO THE POSITION, BOTH AS REGARDS EUROPEANS AND NATIVES, ADULTS AND CHILDREN.

It is difficult to form a correct opinion as regards the diseases incidental to the locality and which affect Europeans ; for the majority of the visitors, either from previous ill health, or a more or less prolonged residence in the relaxing climate of the plains, are more or less predisposed to the effects of a sudden change of climate and temperature, exhibited in those suffering from any particular disease by a temporary exacerbation of its symptons, whilst those in otherwise good health, sometimes suffer on first arrival either from ephemeral fever or diarrhœa.

There are, I believe, very few diseases (as affecting Europeans) whose origin can be attributed to this position. Diarrhœa is the most frequent, and its prevalence is mostly limited to the rainy season. This disease is of a peculiar form, characterized by a complete though temporary inactivity of the liver ; and in the adult the alvine evacuations are of a serous, and in the child of a mucous kind. Next to diarrhœa in point of frequency is sore-throat. This is of an inflammatory nature and affects the fauces, tonsils, and pendulous palate, equally in the adult and child ; but in the latter has a tendency to spread to the larynx and thus produce croup. With respect to the diseases incidental to the position and affecting natives, I beg to annex a table of the principal diseases

treated in the Murree dispensary during the year '59. The table is prepared from the Hospital Register, and includes h out and in patients. A total of 3,568 patients were treated, and th were distributed among the following diseases, in the proportions icated in the table.

Class of Disease.	Specific Disease.	Number.	Tot
Thoracic Diseases.	Asthma ...	8	
	Bronchitis ...	226	
	Catarrhus ...	7	
	Cynanche Tonsillaris ...	34	
	Pleuritis ...	26	301
Bowel Diseases.	Colica ...	116	
	Diarrhœa ...	107	
	Dysenteria ...	108	
	Hœmorrhoid ...	18	349
Liver Diseases.	Ascites ...	3	
	Hepatitis ...	1	
	Icterus ...	4	8
Eye Diseases.	Amaurosis ...	23	
	Opthalmia ...	106	129
eFbrile Diseases.	Febris Intermitt : ...	688	
	„ Remitt : ...	197	
	„ C. C. ...	12	
	Splenitis ...	35	
	Variola ...	4	
	Varicella ...	1	937
Venerial Diseases.	Bubo ...	12	
	Gonorrhœa ...	53	
	Orchitis ...	18	
	Syphilis ...	53	136
Other Diseases.	Debilitas ...	280	
	Dyspepsia ...	183	
	Odontalgia ...	93	
	Psoriasis ...	247	
	Rheumatismus ...	234	
	Ulcers ...	377	1414

The above table gives a total of 3,274 cases. The remaining 294 consist of wounds, accidents, and injuries. From this table it appears

that febrile diseases, affections of the bowels, and thoracic viscera are the most prevalent in the order of mention. And these are the diseases one would expect to be most prevalent in such a position.

(Signed) H. W. BELLEW,
Civil Asst. Surgn.

MURREE,
1*st August* 1860.

From Captain C. W. HUTCHINSON, Superintending Engineer, 2nd Circle, Punjaub, to Lieutenant Colonel E. L. OMMANNEY, Officiating Chief Engineer, Punjaub, —(No. 570, dated Simla, the 7th July 1860.)

I HAVE the honor to acknowledge the receipt of your No. 773 and No. 1160, of 5th and 26th June, calling for an opinion from me upon the different Sanataria for European Troops.

2. I have seen the following Sanataria :—

Simla, Kussowlie, Subathoo, Dugshaie, Dhurmsalla or Bhagsoo, Dalhousie, and Murree ; but I have remained so short a time at each place (periods varying from one day to a month or six weeks,) that I am scarcely prepared to express an opinion upon the various points required in your No. 1160 : the subject is one which should be especially studied and enquired into, in order to express an opinion of any value.

3. I believe that the *character of the soil* is much the same at all these places ; the mass of the hills appears to be composed of sandstone alternating with slaty micaceous schists (imperfectly crystallized clay rocks), and the soil overlying the rocks is generally of a light porous nature.

4. In *accessibility*, Kussowlie, Dugshaie, Subathoo, and Murree, rank foremost : they average from 40 to 50 miles from the nearest large Military station in the plains (Umballa and Rawul Pindee), and the roads connecting them therewith, at present tolerable, might easily be improved.

Dalhousie, though distant from any large Military station, can be made very readily accessible, and it would be the best adapted as regards accessibility for the Troops at Lahore, Umritsur, Jullundur, and all the stations in fact between the Ravee and Sutlej, as well as for Sealkote.

5. I can add nothing new to the descriptions given in the printed report regarding the *character of the scenery* ; I may mention as regards

Dalhousie that it is well elevated, is open to the breezes either from the snows or from the plains, and is well wooded though not so densely as Simla or Murree.

6. *The means of providing amusement and occupation* for the men are, I think, very small at any of these hill stations; such amusements as foot ball and cricket are almost out of the question from want of level space, and from the steepness of the hill sides. Gardening is a matter of difficulty, as it is necessary to go down to a considerable depth below the level of the station before sufficient level space can be found with good soil and plentiful supply of water. I think, therefore, that it may be said that none of these stations afford *satisfactorily* the means of providing healthy amusements and occupation for European Soldiery.

I am inclined to think that Dalhousie would have the advantage in this respect over all the other hill stations I have named. From the proximity of the river Ravee the men might go there for bathing, boating, or fishing; and from the gentleness of the slope of the hill on the north and west faces, ground might more easily be found for gardening or for games, such as cricket, foot ball, &c.

7. The *supply of water* at Simla and Kussowlie is decidedly scanty, and its quality inferior—of Dugshaie, Subathoo, and Murree, I cannot speak on this point. At Dhurmsalla an excellent, constant, and plentiful supply might be obtained from the river Guj at the level of the station, by a prime cost outlay of 5,000 rupees, and I believe a similar sum would also secure an equally good supply at Dalhousie.

8. Regarding *the prevailing winds*, I can say nothing whatever, having taken no note of them.

9. And with reference to the *diseases incidental to the hill stations*, I must also plead entire ignorance.

10. I must again apologize for the meagreness of my opinions generally on the subject of Sanataria; and repeat that it is impossible without having made the subject one of especial study and enquiry, to do it justice.

11. Report speaks most highly of Kumawun, and I would strongly advocate the improvement of the road from Simla to Kumawun, with a view to opening out that country. I observe that Surgeon Grant speaks (in the printed report) in the highest terms of Kumawun, and as his report coincides with all I have heard others speak of it, it is surely deserving of further enquiry and experiment.

Return shewing the prevailing winds for the year 1859, *and total quantity of Rain-fall from* 1*st October* 1859 *to* 30*th April* 1860.

MURREE, 14*th July* 1860.

MONTHS.	Prevailing wind during the year 1859.	Total quantity of rain-fall from 1st October 1859 to 30th April 1860.
January	N. E. and S. W.	19½ Inches.
February	N. E. and S. W.	
March	N. E. and E.	
April	S. E. and W.	
May	N. E. and S. W.	
June	E. and S. W.	
July	N. E. and S. E.	
August	N. E. and S.	
September...	N. E. and S.	
October	N. E. and S. E.	
November...	N. E. and S. E.	
December	N. E. and S.	

(Signed) J. DEAKIN, M. D.,
Assistant Surgeon in Medical charge
Murree Depôt.

From Lieutenant Colonel P. RIGBY, Superintending Engineer 1st Circle, Punjaub, to Lieutenant Colonel E. L. OMMANNEY, Chief Engineer, Punjaub —(No. 969½, dated Murree, the 13th July 1860.)

I HAVE the honor to acknowledge receipt of your letters Nos. 772 and 1159, dated 5th and 26th June 1860 respectively; and as the only Sanatarium in my circle has already been generally reported on at page 25 of the papers forwarded with your first letter, it only remains for me to reply to the particular queries conveyed in your second, under acknowledgment, as to the soil, accessibility, scenery, winds, and water of the station of Murree.

Soil.

2. The hill on which the Sanatarium has been built is composed of masses of sandstone rock, grey and red; the latter in many parts having a lamellar structure, forming in it erosion, the principal soil in which

the masses of rock are embedded. At the surface this material is somewhat enriched by the decayed vegetation with which the hill has ever been covered. There is no limestone in the upper portion of the hill or above the springs of the Sanatarium, although there is abundance below and in the adjacent hills.

Accessibility.

The Murree Sanatarium is easily accessible from the station of Rawul Pindee, from which it is distant but a night's dâk over a good road excellently well drained throughout. The first 12 miles of the road to Barakow is opened for wheel carriages of every kind, and thence Murree is attainable by an easy ride of about three hours, on a gradient of about five in one hundred. All the minor streams on the line are bridged, and all the larger will probably be spanned this year, except three; two of which offer hardly any obstacle to free and constant intercourse, and the third of which requires too large an outlay to be undertaken in the present state of the finances of the state, the more especially as it is at the station of Rawul Pindee, and closes the road but for a few hours during heavy rains.

Scenery.

4. The hill on which the Sanatarium is built is abundantly wooded with the fir, oak, horsechesnut, sycamore, walnut, poplar, pear, hawthorn, and others which require the science of botanists to enumerate them. All around the scenery is grand—hill appearing beyond hill, till the snowy range bounds the view which ever offers in its shifting shadows fresh pictures to the beholder. Even the nearer hills which are destitute of forest, add a pleasing feature to the scenery, all being more or less terraced with patches of cultivation, which give variety of color and an idea of habitants, to what would otherwise appear but a barren solitude.

Means of providing amusement and occupation for the men.

5. It must be confessed that the Sanatarium of Murree is sadly deficient in the means of providing occupation and amusement for the men. There is no reading room, and no level space in the neighbourhood of the barracks, suitable for manly exercises and games; so that but for the walk, which the men appear necessitated to take, under the charge of an Officer, they would have but little exercise. There is a skittle alley, but it can give amusement only to a few, and there is a theatre by the misappropriation of a barrack room,

sufficient to shew the tendency of a large body of the men to find occupation in a rational amusement, and proves the desire of the Military authorities to aid them in so doing, even at the risk of overcrowding the barracks.

6. At the close of 1858, Government sanctioned an outlay of 2,000 to clear a space for games, &c., below the wall and just beneath the barracks; but circumstances prevented the work being taken in hand last year, and it is now found that the guess on which the above grant was made, greatly underrated the required outlay. I am now having sections taken of the area proposed to be levelled, and I would strongly recommend the improvement which might be done, partly by the pioneers and by some addition to the grant already made. The ground would probably suffice for a cricket ground and for a gymnasium.

7. I would also urge upon the authorities the expediency of building a reading room and theatre or lecture room, both of which could be done at a moderate outlay. The foundation of what was to have been No. 6 barracks, would do admirably for a theatre; the most expensive portion of the building is therefore ready. A reading room could be built on the barrack hill, and this desideratum should not be delayed.

Supply of water.

8. It is I believe acknowledged that of all the hill stations Murree possesses the best supply of water, both as regards quality and quantity. For the use of the depôt there are four springs almost immediately under the barracks, the water of which percolates through so short a distance of the hill as to be almost free of vegetable impurities, as proved under a recent analysis. The springs are well cared for, having tanks built to prevent wastage at night, and conduits for drinking water.

10. The four springs reserved for the depôt afford at the present time after nearly two months drought, an aggregate quantity of about 5,000 gallons in the twenty-four hours, and numerous other springs about the station give an ample supply for the large wants of its numerous residents. The quantity of water, however, abundant as it is, would doubtless be greatly diminished if the trees and brushwood about the Sanatarium be cleared away; and when the latter, therefore, gives cover to the natives to commit a nuisance, other means than clearance or cutting should be resorted to.

11. Of the prevailing winds at the Sanatarium but little information appears to have been recorded, the Surveyors who have registered the rain during their stay having taken no note of the wind. I append, however, a register for 1859 kept at the depôt Hospital.

Prevailing winds.

12. In the papers on sanatory establishments forwarded to this Office, 51⅓ inches is the quantity of rain which fell in 1856, said to be unusual, 35 inches being given as the probable average. This is in my opinion much too low. The gauge kept by the officers of the Great Trigonometrical Survey gives the average of rain for the six months of their stay at Murree 40 inches, and 15 is probably the average of the remaining six months; 55 would, therefore, in any opinion be nearer the annual average than 35. Meteorological registration appears however, in this country to be little attended to, being generally the labor of amateurs, some of whom are interested in one branch, some in another, so that at no one station can a perfect system of registration be expected. In no one register have I ever seen the measure of ozone, an omission as regards the season of 1858, when cholera appeared in its worst form, that is greatly to be regretted.

Rain.

13. To enable me to reply to your seventh query, I have applied to the Medical Officers of the depôt, whose opinions are subjoined on the "prevailing diseases incidental to the position, both as regards Europeans and Natives, adults and children."

Doctor Deakin, in charge of the medical depot writes, "I beg to state that it is extremely difficult to discriminate the peculiar characteristics of any climate, but more especially of that of a hill station in India, as most of the people who resort there have lived in the plains for a period more or less prolonged, and have thus contracted, if not actual diseases, at least a predisposition to many of them. Of course, not being able to discover with correctness the characteristics of a climate, it makes it not easy to point out the prevailing affections incidental to the locality. However, as regards Murree, there exists no doubt as to the influence of the rainy season on all bowel complaints, and therefore it may be stated with accuracy that diarrhœa and dysentery are rife and incidental to the rainy months at this Sanatarium."

"Seldom or ever have I seen complaints of an inflammatory character develope themselves here. During the winter, and when any sudden change

of temperature takes place, it is not uncommon to see come into hospital patients with sore-throat, and other affections of the mucous membrane of the respiratory canal, but these cases seldom prove severe. Indeed, I have only met with one of a dangerous description since I have had charge of this depôt—children thrive very well here, and no peculiar incidental disease affects them."

"I cannot speak of the natives, those amongst them who seek for medical aid resort to the dispensary which is under the superintendence of Dr. Bellew, Civil Surgeon. He no doubt will be able to supply you with any information you may require on the subject."

Doctor Bellew, the Civil Surgeon, writes, "During the winter and spring months, the natives of all age are subject to inflammatory affections of the respiratory organs, and to fevers of the intermittent and continued types. I am unable to offer an opinion supported by facts, as to the effects of this climate on Europeans (residents in the station and not in cantonments) during these seasons, as their number is very limited, and their circumstances such as to enable them to protect themselves from the ordinary causes of disease. During the summer and rainy seasons, intermittent fever and bowel complaints are very common among the natives, and prevail to some extent among the European visitors also. These, however, it must be borne in mind, are, for the most part predisposed to disease, owing to ill health, the result of previous sickness or prolonged residence in the relaxing climate of the plains. During this season also, inflammatory affections of the throat not unfrequently occur among Europeans, both adults and children, but chiefly the latter. Beyond these I know of no diseases peculiarly incidental to this locality."

From Lieutenant Colonel E. L. OMMANNEY, Officiating Chief Engineer, Punjaub, to Major G. HUTCHINSON, Officiating Secretary to Government Punjaub, Military, Department,—(No. 3699, dated Lahore, the 29th October 1860.)

IN compliance with the orders conveyed in your docket, No. 3006, of the 25th May, and your letter No. 3591, of the 23rd June last, I have now the honor to forward letters from the Superintending Engineers, 1st and 2nd Circles, giving their opinions on the Military Sanataria in the Punjaub.

2. Colonel Rigby, Superintending Engineer, 1st Circle, reports fully on the points in your letter requiring definite notice in regard to Murree, the only Sanatarium in its Circle; viz.,

1 The character of the soil
2 Its accessibility
3 Character of the scenery
4 Means of providing amusement and occupation for the men
5 Supply of water and its quality
6 Prevailing winds
7 Prevailing diseases incidental to the position, both as regards Europeans and Natives, adults and children.

3. On the three first points I need not remark, as there is nothing to object to; in regard to the 4th, Colonel Rigby states that Murree is sadly deficient; there is no reading room, no level space in the neighbourhood of the barracks suitable for manly exercises and games. He is now having sections taken of the area just beneath the barracks which was proposed in 1858, to be cleared and levelled for the use of the men, at a cost of 2,000 Rupees. The outlay will probably exceed this sum, but the superintending Engineer strongly recommends the improvement, in making which the pioneers might aid. The ground, he says, would probably suffice for a cricket ground and for a gymnasium.

4. Colonel Rigby also urges the expediency of building a reading room and theatre, or lecture room, which could be done at a moderate outlay.

5. The above proposals have my entire concurrence, and I would recommend that authority be given to include their probable cost in the next Budget.

6. Sir J. Lawrence was of opinion that, if the whole of the grounds within the Military boundaries had been reserved for public purposes, and if the southern portion of the Civil stations had been added to the cantonment; in the first instance, there would have been but one real objection to the depôt, and this is that it is situated on a narrow ridge with abrupt slopes on both sides of it—there is no spot available for the Soldiers to amuse themselves—but this very objection makes the depôt remarkably dry. It is open on all sides to the air.

7. Some Medical man have considered that the altitude is too great, and that Soldiers sent to a hill climate in a weak state of health require a lower and more sheltered site: this Sir J. Lawrence considered a mistake—the choice sites of the Civil station being still higher, and no place can be more dry, healthy, and pleasant for hill climate during the rains than Murree.

8. I remember however to have heard during my tours of inspection to Darjeeling, the same complaint regarding the site of the convalescent depôt there; it is 500 feet higher than the station, and consequently the fall of rain is greater than in the station; the mist not less, and wind and lightning much more. Snow and hail lie longer on the ground, and often fall when there is none in the station—the cold is greater.

9. The convalescents prefer sitting over the fires in their barracks to going out working in the gardens, or taking sufficient exercise; and it was thought that a lower and less exposed site would have been more suitable.

10. From the memorandum given in the printed papers it will be seen that the death rate has, notwithstanding these objections, been much lower at Darjeeling than either at Landour or Murree.

11. Murree enjoys the advantage of an abundant supply of good water immediately under the barracks.

12. The Superintending Engineer, 2nd Circle, Captain Hutchinson, states that Kussowlie, Dugshaie, and Subathoo, are the most accessible Sanataria in his Circle, being only from 40 to 50 miles from the nearest large Military station of Umballa; they are connected with each other by cart roads, and Kussowlie by the direct mule track is only nine miles from Kalka at the foot of the hills.

13. Dalhousie is more distant from a large Military station; but can be made very readily accessible for the Troops at Lahore, Umritsur, Jullundur, and Sealkote.

14. Dalhousie is not so densely wooded as Simla or Murree, but is open to the breezes from the snows or from the plains. Level space is much wanting at all these stations for such amusements as foot balls and cricket. He thinks Dalhousie would have the advantage in this respect over all the other hill stations, the slopes and sides of the hill being less abrupt.

15. The supply of water at Simla and Kussowlie is scanty, and of inferior quality,—at Dhurmsalla and Dalhousie a plentiful supply of water might be obtained at small cost.

16. At Subathoo, the least healthy of the hill stations, three upper story barracks have lately been completed and occupied, affording excellent accommodation for 300 men.

17. In the old barracks the accommodation is not so good; but there is now ample room for an entire Regiment, and some of these old barracks are very well situated, whereas others* are placed too close to the hill side, preventing thorough perflation.

18. I would not advocate the erection of any more expensive barracks at Subathoo, the death rate at this station having been, Dr. Mackinnon observes, beyond that of several stations in the plains. The hospital is a very fine building, and well situated.

19. Kussowlie is only 8 miles from Subathoo, and more than 2,000 feet higher—is only nine miles from Kalka. At the foot of the hills six new barracks are nearly completed, which will accommodate 250 men; two old barracks can accommodate 70 men each, and two married barracks 20 families each.

20. Two large barracks to hold 250 each were burnt down in December 1858. These were on the same plan as the new hospitals at Subathoo and Kussowlie, which are so highly commended by the Inspector General of Hospitals.

21. An estimate for re-constructing these two barracks as single stories has been sanctioned by Government, and will be included in the Budget for 1860-61. There would then be accommodation for 680 men at this station.

22 A tunnel has been driven into the hill near the dâk Bungalow, which affords a plentiful supply of water at all seasons.

23. In regard to means of providing amusement and occupation for the men, more might certainly be done at Murree by converting all the available ground in the immediate vicinity of the barracks into smooth terraces and walks, with inexpensive rustic seats placed round trunks of trees, or in other convenient spots. I pointed this out to the Superintending and Executive Engineers in my late visit to that station, and directed that provision should be made in the annual estimates for

making good foot paths and roads round the barracks and steps to the doors.

24. More might in this way be made of the ground round barracks at all Sanataria, and it would add much to the comfort, convenience, and amusement of the men.

25. In conclusion it may not be inappropriate to mention the extraordinary healthiness of the European Troops at Peshawur this season; the 98th Regiment had not more than 3 per cent. in hospital at the time of my visit during the present month of October, and had not had more during the whole year. The 7th Royal Fusiliers' had about double that proportion of sick to strength. The Artillery hospital, a magnificent building, completed in 1855, at a cost of Rupees 68,800, has never been occupied, except by the Royal Artillery, where they were located on the first arrival at that end of the station.

26. At Murree, some 40 of the men at the depôt were up there on furlough, as well as several women and children, and they will all doubtless derive benefit from the change, perhaps to a greater extent than those who were sent up sick.

From Lieutenant Colonel C. B. Young, Secretary to the Government of Bengal, in the Public Works Department, to the Secretary to the Government of India, Military Department,—(No. 1219, dated Fort William, the 26th March 1861.)

It was stated in the 10th paragraph of my letter No. 2712, dated the 9th July last, that Major W. S. Sherwill, who had surveyed for revenue purposes, and travelled among the Vindhya hills, had been called upon to report whether there were any localities amongst those ranges which would serve as Sanataria, or as small convalescent depôts for European Troops; and in the 4th paragraph of the same letter it was observed, that Mr. G. U. Yule, the Commissioner of the Bhaugulpore division, had been desired to submit a similar report in regard to the hilly ranges situated within the districts under his control.

From Commissioner of Bhaugulpore, No. 132 of 17th July 1860, with enclosure.

From Major Sherwill, No. 445 of 11th idem, with enclosure.

2. I am directed to submit, for the information of His Excellency the Governor General in Council, the replies that have been received from those Officers, as noted on the margin.

3. With reference to the remarks made by Major Sherwill, in his letter of the 11th of July last, the Commissioner of Bhaugulpore was asked to furnish a full report regarding the Teeur hill, situated upon the high land near Deoghur, and to the south of Bhaugulpore; and having an elevation of about 2,500 feet above the sea.

4. With reference to Major Sherwill's report, Captain Layard, the Officiating Superintending Engineer of the Northern Circle also, was directed to submit a professional report regarding two of the localities indicated; *viz.*, Maira or Maruk hill, which was described as a fine flat-topped hill, thirteen miles south of Monghyr, at an elevation of 1,500 feet above the sea; and the north-eastern extremity of the Rajmehal hills, described as one of the most extensive, convenient, accessible, and cheerful spots in Bengal for cantonments.

5. And lastly, Major Sherwill was requested to examine personally, and to report with more detail upon the hill called Mahooagurree, in the Sonthal Pergunnahs.

6. This last report the Lieutenant Governor regrets to state, Major Sherwill has been prevented by sickness from submitting; but its loss is greatly compensated by the interesting reports relative to the Mahooagurree hill received from Mr. Yule and Captain Layard, as contained in their letters Nos. 228 and Y., dated respectively the 22nd February and 27th January* last, copies of which are herewith submitted for information; and from Dr. Balfour, a copy of whose letter was forwarded with the letter from your Office, No. 17, of the 1st February last.

* With a Map.

7. With reference to the 3rd paragraph of Mr. Yule's letter under transmission, I am to state, that the height of all stations or places recorded on the revenue survey maps is calculated above mean sea level; and that the height of Mahooagurree is therefore only 1,660 feet above the sea.

8. Captain Layard, the Superintending Engineer, recommends that a road of approach to Mahooagurree should be made from Moradoi station in the railway, and by the Bansloi valley and the village of Salinghee on the north; the distance from the railway being thirty miles. The cost of making a road of practicable ascent would be about 500 Rupees, for which sum he believes, Mr. Eaton, an old resident of Pulsa, (Moradoi) and owner of several coal mines in the neighbourhood, would engage to make it. A metalled road from the hill to the

rail, which is also recommended to be made, would cost, it is stated, about 30,000 Rupees. The materials for building purposes, and water for the laborers are abundant on the hill. The site suggested for the Sanatarium is Pakoria village, situated on some Table Land on top of the hill.

9. In most of these recommendations, the Commissioner, Mr. Yule, concurs, and he has directed his assistant, Mr. Taylor, to erect a small Bungalow on the hill, at a cost of 50 Rupees, for the accommodation of travellers who carry no tents with them; and he further suggests that one on a larger scale, with a few sheds be sanctioned; that every means be taken of diffusing the knowledge that such a place exists within twenty-four hours of Calcutta, and every encouragement given to visitors to settle there; and that, when ten or fifteen applications have been made, Government should take steps to form a road to the place, and to lay out the hill-top.

10. Having taken into consideration all that has been said, and all the recommendations made, the Lieutenant Governor is of opinion, that the account of the hill is as favorable as possible for a place of no greater elevation than 1,600 feet above the sea. The only information wanting is as to its freedom from fever at *all* seasons.

11. If such a place were in the neighbourhood of a barrack for European Troops, the Lieutenant Governor would think that its use as a place for change of air for convalescents might be desirable. But he doubts the advisability of going to any expense for the sake of European Troops on a hill of this low elevation, which is also as remote as this is from any station where European Troops are stationed.

12. As a place for cottages for Europeans, being within thirty miles of a railway station, it seems to the Lieutenant Governor to be more promising. I am accordingly directed to say, that Mr. Yule's outlay of 50 Rupees for a small Bungalow, and of 500 Rupees for a road, has been sanctioned, but nothing more has been sanctioned at present; and with the view of securing the publicity desired by the Commissioner, these papers will be forwarded to the Secretary to Government in the Home Department, for publication in the Supplement to the *Government Gazette*, and for general information.

13. To conclude this part of the subject, I am to add that a copy of the letter from your Office, No. 17, of 1st ultimo, above quoted, to-

gether with its accompaniments, has been forwarded to the Civil and Public Works authorities, with a request that they will afford such aid as may be necessary in carrying out the wishes of Government.

14. With reference to the 3rd paragraph of the present letter, I am directed to forward copy of the report therein alluded to, in regard to the Teeur hill, which has since been received from the Commissioner under cover of his memorandum,* No. 18, of the 16th February last.

* With a Sketch.

15. It is a report from Mr. Braddon, the Assistant Commissioner of the Sonthal Pergunnahs, and from it is evident that all hope of planting a Sanatarium upon Teeur must be abandoned. The hill has no Table Land for building purposes on its top; some of its ranges consist of conical peaks, while others assume the shape of spinal ridges, the sides being very precipitous. The only advantage which the hill possesses is its elevation; but a situation more remote from all public roads, or large stations, Mr. Yule says, is scarcely to be found.

16. The next hill in connection with the great Vindhya range now being treated of, is the Maira or Maruk hill, alluded to in the 4th paragraph of this letter, and regarding which it was remarked, that Captain Layard had been called upon to submit a professional report. This also has been received, and a copy of it (No. 539, of the 21st ultimo) is herewith appended, as one of the enclosures of the present communication.

17. Captain Layard found that the hill named indifferently Maira or Maruk, consists of two distinct hills; but he describes both as being totally unfit for the establishment of Sanataria. The scenery amidst which they stand is beautiful; but they have precipitous ascents, their sides are rugged; there is no plateau; and the change in temperature is very small compared with the plains below, whilst building materials are scarcely obtainable.

18. The Lieutenant Governor therefore conceives, that all thoughts of going to any expense for sanatory purposes must be set on one side.

19. Finally, I am directed to forward Captain Layard's Report* on the different localities in the Rajmehal hills, alluded to in the concluding part of

* No. 507 of 11th February 1861.

the 4th paragraph of my present letter. Regarding the most important of these ranges, *viz.*, the Mahooagurree hill, the Superintending Engineer has already reported: and he now furnishes an account of the remaining ranges.

20. The report is not favorable—the best site found was just above Sahibgunge station; but even here the Superintending Engineer cannot recommend any trial being made, and in this view the Lieutenant Governor entirely concurs.

21. The specimen of spring water forwarded by Captain Layard, the Superintending Engineer, have been reported by the Chemical Examiner to Government to be of unexceptionable quality.

22. In conclusion, I am desired to say, that this letter is intended to be a reply in part only to your reminder No. 882, of 19th February last; and that when further information regarding other localties has been received, a further report will be made in continuation of the present.

From G. U. Yule, Esq., C. B., Commissioner of the Bhaugulpore Division, to the Secretary to the Government of Bengal, Department Public Works,—(No. 132, dated 17th July 1860.)

In reply to your letter No. 2214, of the 5th ultimo, I have the honor to state as follows:—

2. In this division there are three distinct hilly tracts, and one of which may be called Table Land. The first is the Damun-i-Koh, with its off-shoots. It is about 100 miles long and 30 broad, bounded on the north by the Ganges, on the east by the plains of zillah Moorshedabad, south by Beerbhoom, and west by zillah Bhaugulpore; the rail runs up its eastern side at no great distance from it, and close underneath its most northern range. This tract is full of hills covered with jungle, none exceeding 1,600 feet high, and some with a considerable extent of Table Land at top. Towards the north, facing the Ganges, they are notoriously unhealthy; in the interior they are not so reckoned; but though Europeans live and thrive in some of the valleys, none have yet passed a year on the hills. Last year I ascended a hill on the south-west edge of this tract called Mahooagurree, said by Captain Sherwill to be 1,600 feet high. It is about 36 miles from the railway, to which there is a good fair-weather road. The top I estimated to be four or five miles long, and averaging half a mile broad; in some

places quite flat--even winter rice growing there; but generally with irregular elevations and depressions—with gentle slopes—water plentiful and good—one spring at least never drying in the driest seasons. A considerable portion of the top was clear and contained two villages of hill people, shaded by fine mango and tamarind trees. The jungle on the uncleared portion would not be difficult to clear. Timber of not a very good quality was plentiful on the sides and at the bottom of the hill; limestone was said to exist at one spot about half way up. The northern foot is washed by the Bansloi river, running through a beautiful valley some twelve miles long, by two to four broad. This river could, I verily believe, be turned into a canal as far as the rail, at no great cost. A natural dyke crossing the river at Amrapahar, where it issues from the above valley, could be raised so as to keep the channel full of water to the top of its banks throughout the valley, and another but smaller dyke at the western entrance of the valley might be treated like the other, so that there would always be an ample supply of head water to fill the bed of the river between the valley and the rail, where of course a dam would require to be thrown across, as also perhaps at one or two intermediate spots. On the bank of the Bansloi, opposite Mahooagurree, there is a fine coal field; one bed 18 feet thick I believe, which is not worked in consequence of the expense of carriage, and this coal alone might pay for the canal. The climate on the hill seemed very fine in the cold weather, but I cannot say what it would be in the hot winds and rains. Rice and oil-seeds grow luxuriantly at the top. I believe cotton and coffee would also do so, and I have no doubt but that a mixture of the black vegetable soil of the hollows, with the red clay at top, would afford magnificent European vegetables.

3. The above is the opinion I formed from my own visit. I annex copy of a report* on the subject from Doctor Goss, who lately visited the hill. He went up on the north to the village only on the north-east corner of the hill; I went up to that village from the south side, and along the whole top to the western slope where I descended: this accounts for our very different estimate of the extent of land available for buildings, gardens, roads, &c.

* Dated 11th July 1860.

4. Whether this hill would be healthy in the hot weather and close of the rains—the two unhealthy seasons of the Sonthal districts—I cannot say. Dr. Goss says, the Pahareeas complain only of an

occasional case of fever in the hot weather, but we cannot infer from this that Europeans would be equally free of fever. Generally speaking, small pox is the most destructive disease among the hill people, and next to it cholera.

5 The next cluster of hills is that of Khurruckpore, a few miles south-east of Monghyr. These hills are of no great height, and are so unhealthy that I need say nothing of them, or of the Chuckye hills, about 30 miles south of the Khurruckpore range, and equally unfitted for Sanataria, though on the south side there is some high Table Land which, if it was within reach of any place, might be turned to some use.

6. The same objection of inaccessibility applies to the Deoghur Table Land, alluded to in the 2nd paragraph of this letter. Some portions of this are, I believe, 1,000 feet above the sea; the country is in many places very open, and where it is not, the jungle might easily be cleared; the natural drainage is quite first-rate both from the configuration of the surface and the nature of the soil; the hot winds are rather disagreeable, but the rains set in early. Altogether I know no more promising spot for European Troops to be stationed if they could be of any use there, which unfortunately they could not be until the line of rail is run across from Raneegunge to the Ganges somewhere about Monghyr, and this line would render Deoghur easily accessible, and open out the Kurhuradee coal bed.

From W. F. Goss, Esq., Medical Officer, Sonthal Pergunnahs, to G. U. Yule, Esq., C. B., Commissioner Sonthal Pergunnahs,—(Dated the 11th July 1860.)

I have the honor to inform you that I have examined the Mahooagurree hills with the view of discovering a place suitable for the residence of Troops, and after carefully exploring the top, I have no hesitation in recommending the adoption of Pakooria, where there is a large level space of probably 25 or 30 beegahs clear of jungle, which would answer for the men's barracks, while several smaller spaces close at hand would be available for Officers' bungalows, store-houses, hospitals, &c. The advantages of Pakooria are as follows :—

Extent. 1. The extent of available building ground.

Position. 2. It is open on three sides, commanding an extensive view, and having a very free circulation of air in almost every direction. This, of course, is a point of the greatest consequence, and one of the chief recommendations of the place.

3. There are three springs which, I was assured by the Paharia residents, have never been known to dry up even in the hottest weather.

Water.

4. Large timber cannot be procured on the top of the hill, but at the foot there is a pretty good supply. Sâl trees (for rollers) and bamboos are found all over the hill in most profuse quantities. Within half a mile of the level space alluded to above, is a supply of sandstone of two sorts; one sort in large masses, but not of very good quality for building; the other sort is found scattered about in small blocks of a suitable size, and is very compact and hard; grass for thatching is very abundant, and after the rains, is six or eight feet high, and very durable. Roofs thatched with this grass remain for ten years without requiring repair.

Building materials.

5. There are about 150 Paharias on the top, and I was assured by them that there never was any illness amongst them, except an occasional case of fever about the beginning of the hot weather.

Healthiness.

6. As my visit was paid in the midst of the rains, I can only speak of the climate from the accounts of the natives. They assured me that in the hot weather they always enjoyed a cool breeze, and that the top of the hill was considerably cooler than the plain below.

Climate.

7. Pakooria is about 35 or 40 miles from the Dhetara station on the East Indian Railway. By making a road between Pakooria and Slingee (about a mile), the hill would be at once in communication with the railway, as a road already exists between Dhetara and Slingee. Thus one forced march would bring the Troops within reach of any part of India to which the railway may extend.

Means of communication.

Should the Government entertain the idea of establishing Troops at Pakooria, it is to be hoped they will have the hill surveyed by some one better acquainted with the requirements of a Military station, &c., than myself, before finally deciding.

P. S.—Mr. Taylor, Assistant Commissioner, Sonthal Pergunnahs, who accompanied me, and is well acquainted with the Himalayas, assures me that the level ground on the top far exceeds that of Simla, Kussowlie, and Landour put together.

From Major W. S. SHERWILL, Boundary Commissioner, to Lieutenant-Colonel C. B. YOUNG, Secretary to the Government of Bengal in the Public Works Department,—(No. 445, dated the 11th July 1860.)

I have the honor to acknowledge the receipt of your letter No. 2215, dated 5th June 1860, and its annexed papers.*

* 1. Copy of letter No. 952C, dated 6th February 1860, from Officiating Secretary to the Government of India in the Military Department.
2. Copy of printed papers having reference to the establishment of Sanataria for European Troops in India.

2. Agreeable to your request that I should state, for the information of His Honor the Lieutenant Governor of Bengal, whether I am acquainted with any spots lying within the jurisdiction of His Honor that are suited for the purposes of Sanataria, or small convalescent depôts for European Troops, I proceed to note, in alphabetical order, nine such localities that I have met with during my survey operations, notices of which I find in my Field Books and other professional Journals.

3. From these notices it will be perceived that, with the exception of, the Sargooja Table Land, the Singaleelah range in the Himalayahs, and the Rhotas Table Land, no one locality therein described, can be considered eligible for a Sanatarium upon any extensive scale; the minor hills will, however, in my opinion, be found well suited to serve the purposes of small convalescent depôts for European Troops; and although, as a general rule, their elevation above the sea is small, and the space on their summits limited, I nevertheless believe that the slightest change in scenery, air, food, or water that can be given to a convalescent Soldier in India, would be an act of humanity, and one tending in all cases of convalescence to ultimate and perfect recovery, especially when, as is generally the case with the European convalescents, after having lain for weeks in the Military hospitals with dead walls to gaze upon as their only scenery, the only air they can possibly breathe, contaminated with endless impurities, their spirits depressed, and wearied in mind and body, they pine for change. In such cases, if the change is merely from the hospital to 1,000 feet elevation, but accompanied with cheerful scenery, fresh air, and a slightly lowered temperature, the effects would doubtless be most surprising and satisfactory.

4. The small hill alluded to in your 3rd paragraph you will find described under the head of "Beharee Nath."

5. Accompanying this letter is a lithographed map of the districts of Bengal, Behar, and Orissa, upon a scale of thirty-two miles to an inch, upon which I have marked all the localities described in the accompanying notes.

BEHAREE NATH.

Latitude 23° 34′, *Longitude* 87°.

BEHAREE NATH is the name of the small sandstone hill, alluded to in paragraph 3 of your letter under acknowledgment, as being near Raneegunge, and upon which I have been in the habit of taking observations with the students of the Civil Engineering College. The hill is situated twelve miles south-west of Raneegunge, in the district of Pachete, and two miles from the south bank of the Damoodur river; its elevation above the sea is 1,473, and above the plain 1,100 feet; it is slightly covered with bush jungle, bamboos, and grass; but from its very limited summit-area, it could never be available as a Sanatarium for any large body of men. But I am of opinion that a few men from Raneegunge might, with advantage, be sent to its summit for change of air.

The view from the summit is very extensive and pleasing, overlooking Raneegunge and the whole of the Damoodur coal fields to the north, and a wild broken hill and jungle tract to the south; the two tracts separated by the broad sandy Damoodur river.

Water is only found at the base of the hill. The difference of temperature between the summit and base is 5.°

From the peaked formation of the hill every wind that blows is felt on the summit.

MAIRA OR MARUK.

Latitude 25° 10′, *Longitude* 85° 32′.

This is a fine flat-topped hill, thirteen miles south of the Civil station of Monghyr, elevated about 1,500 feet above the sea, or 1,300 above the Ganges. The surface of the hill is about a quarter of a mile in length, by 100 yards in width, with a precipitous descent on all sides, and would form an excellent spot for a hospital barrack, where

Soldiers from Dinapore might be sent for change of air. The view from the summit is exceedingly cheerful, embracing about thirty miles of the Ganges, the station, fort, and city of Monghyr; and at certain periods of the year a grand view of nearly 200 miles of the snowy range of the Himalayahs.

The level summit is covered with light jungle, bamboos, and grass; water is only procurable at the foot of the hill. The slopes of the hill are covered with a forest of moderate sized timber trees.

The geological structure of the hill is slate, capped with laterite.

The climate during the rainy season on the top of this hill is most delightful, and there being no higher land near, every breath of wind is fully felt at all seasons. I believe the spot to be thoroughly healthy.

MUHOOA GHURREE HILL.

SEE

RAJMEHAL HILLS.

THE RAJMEHAL HILLS.

Latitude 25° 14', *Longitude* 87° 48' *to* 87° 36.'

One of the most convenient, extensive, accessible, and cheerful spots that I am acquainted with in Bengal, that might be used as a temporary cantonment, though perhaps, strictly speaking, not as a Sanatarium, .is the summit of the northern Rajmehal hills, where the hills form the right bank of the river Ganges. These hills rising to the height of 1,500 feet above the sea, or 1,300 feet above the Ganges, extend from east to west for ten miles, with a comparatively level surface, and with a width varying from half a mile to a few hundred yards. The climate, which is neither bracing, nor even temperate, is some degrees cooler than that of the plains, as the summits of these hills are never parched up by the terrible heat of the plains. There is abundant space for many thousand men—clay for bricks, and stone for building purposes are adundant—there is a limited supply of large timber on the southern slopes of the hills.

On the southern side of the range, and immediately below the hills that lie to the west, situated between two small Sonthal villages, Singtee and Simurtola, is a bed of fresh water limestone well suited for all building purposes. The summit of the hills is reached from the plains in half an hour. The railway runs along the whole length of the hills, and would be convenient for every purpose of transit and conveyance of stores. It is accessible at all seasons of the year, either by rail, or by the river steamers; the latter could anchor and discharge Troops, Military stores and cargo at any point along the river front. A few guns placed upon the crest of several projecting points on the hills would command the road at the foot of the hills, as well as the entire navigation of the Ganges.

I believe that a moderate elevation, with pleasing scenery, to be more beneficial to invalids, than a greater elevation would be on a dreary flat country like Cherra Poonjee, or Hazareebagh, where there is nothing to please the eye or the imagination; and I fully concur in the remark made by Major F. D. Atkinson, Officiating Secretary to the Government of India, Military Department, in his letter No. 952C, dated 16th February 1860, to the Secretary to the Government of Bengal, that "the character of the scenery and the means of obtaining occupation and amusement, which in the case of men, no less than Officers, very materially affect the health of Troops."

The view from the summit of these hills is very extensive, cheerful, and interesting; about fifty miles of the river Ganges are visible, and this is the widest and grandest portion of the great river. The constant passing and re-passing of steamers and country boats of all descriptions; the immense distances to which the eye wanders when looking over the cultivated plains of Purneah and Bhaugulpore; the beautiful and extensive view of the snowy range of the Himalayahs, occasionally seen during the rainy season and cold weather, are objects that, at the time they would please, would also interest and give rise amongst the men to conversation and cheerfulness.

Upon the extreme eastern portion of the range is a handsome waterfall; a couple of miles walk to reach which would be good exercise for the convalescents, who would be well rewarded for their labour by the beauty of the scenery at the spot. Excursions down into the great central valley, and pleasant shady walks on the summit of

the hills, would also afford amusement to many, as would also making collections of minerals, birds, insects and reptiles, besides other specimens of Natural History with which these hills abound.

All the lower tracts of jungle lying within and without the Rajmehal hills have a deadly climate from March to October, so has the Terai lying at the foot of the Himalayahs, and so have all the deep valleys in the Himalayahs, even to within eight miles of the perpetual snow. The question is, at what elevation is the European constitution safe from malaria: judging from the natives I should say that the malaria does not reach to the summit of the northern Rajmehal hills; first, because the natives appear healthy; secondly, the ridge being narrow, is swept by every wind that blows, thus diminishing the possibility of any miasma resting on the summits of these hills; and when these hills shall have been cleared of their under-wood, there will be still less chance of malaria being generated or collected.

The hills are of a basaltic formation, capped by laterite, and from their peculiar formation, roads from the plains would be of easy construction; at somespots one in cline, and in others, two or three zig-zags would reach the summit.

For any further particulars of these hills and of the tribes inhabiting them, I beg to refer you to a report written by myself, and published in the Asiatic Society's Journal, volume XX., page 554.

The convalescents from Berhampore and Dinapore would, I feel convinced, derive much benefit from a residence on the summit of the Rajmehal hills.

Another and a very cheerful spot in the southern hills, named Mahooagurree, elevated about 1,500 feet above the sea, is a fine flat-topped bluff of sandstone* that stands at the southern entrance to the Puchwara pass, or the pass leading from Bhaugulpore to Moorshedabad, and where the Bansloi river divides the Rajmehal hills into two portions. This hill projects well into the district of Bhaugulpore, and from whichever side it is viewed, presents the same bold and lofty appearance: it is four miles in extent, and is connected with the southern mass of the coal-bearing hills, and has

*Latitude 24° 29'. Longitude 87° 27'.

an abundance of coal at its foot. I have never been on its summit, upon which are several villages of hill men.

PARUSNATH MOUNTAIN.

Latitude 23°, 58′, *Longitude* 86°, 11′.

Of this fine mountain, situated in the Ramghur district, at a distance of 188 miles north-west of Calcutta, its capabilities as a Sanatarium and of other matters connected with this spot, I wrote some years ago a full report for the information of the late Lieutenant-Governor of Bengal; but I am sorry to say I retained no copy of my letter. This is of little consequence, as the building has already commenced on the part of Government upon the north-western shoulder of the mountain.

The elevation of Parusnath above the sea is 4,483 feet, and by its *flora,* which in its nature is that of a temperate climate, we may be assured that the climate will be found highly beneficial to the European constitution.

THE FORTRESS OF RHOTAS IN THE DISTRICT OF SHAHABAD

Latitude 24°, 37′, *Longitude* 83°, 50′.

The fortress of Rhotas or Rhotasghur, situated in the district of Shahabad, occupies the level summit of lofty mass of sandstone, twenty-two miles in circumference, that is surrounded on all sides by precipices, some of which are upwards of 1,000 feet in vertical height. The general height of this mountain is 1,490 feet above the sea, or 1,190 feet above the river Soane, which flows on two sides of it. This mass of sandstone resting on limestone, forms the eastern shoulder of the great sandstone plateau that traverses the principality of Rewah, and the districts of Mirzapore and Shahabad, and is separated from the main range or plateau by two deep chasms, one on the south and one on the north side of a narrow ridge, a road along which forms the only entrance to the fortress on the western side, and this is defended by a strong gateway with flanking defences.

The view from the summit is very extensive, and peculiarly cheerful. It embraces the whole of the western and fertile pergunnahs of Behar, the coal fields in the wild, hilly, and jungle-clad district of Palamow in the south-western frontier agency, separated from Behar by a bold range of granite hills, whilst the broad and blue-watered river Soane separating the districts of Behar and Shahabad, and the grand sandstone precipices that are seen on every side, form fine features in the landscape.

There are several passes leading up to the fortress, up and down which I have led horses; and with a small amount of labor, principally consisting in removing loose stones, these paths might be rendered passable for doolies, palanquins, and horsemen.

Water is abundant on the mountain; several ancient tanks near the old Mahomedan palace affording a bountiful supply. The Dewan Khanah and some other buildings belonging to the old palace, might be easily converted into barracks for convalescents from Dehree, on the Grand Trunk Road, distant twenty-four miles, and from Dinapore distant 100 miles.

The thermometer stands 4° lower than it does in the plains. There is plenty of firewood, some cultivation, and a few villages upon the summit of the mountain.

In 1819 an experimental Government Stud was established at Rhotas, but several horses that had been frightened by thunder storms having been lost over the precipices, the Stud was removed to Buxar; so at least is the tradition on the spot.

The climate, as far as I was able to judge from several short residences on the summit, is healthy and exceedingly dry, the air from this cause being highly electrical.

TEEUR HILL.

Latitude 24°, 30′, *Longitude* 86°, 54′.

This is a very fine gneiss hill in the Sonthal pergunnahs, in the northern part of pergunnah Saruth Deoghur, of the district o

Beerbhoom, eight miles east of Deoghur, where are the head quarters of an Assistant and Sub-Assistant Commissioner of the Sonthal pergunnahs. At Deoghur is the yearly rendezvous of many hundred thousand pilgrims from Western India.

The hill* Teeur is situated upon the high land forming the watershed between the Ganges and the Bay of Bengal: the hill is about 2,000 feet above the sea, or 1,500 feet above the high land upon which it stands. It is situated partly in cultivation and partly in jungle: it is covered with heavy jungle from the base to the summit, giving shelter to numerous tigers, leopards, bears, stags, (sambur) peafowl, jungle fowl, and other wild animals.

As I have never visited the summit, and as I know no one who ever has, I can say nothing about it, except that judging from the view* presented from the plains below, there must be an abundance of building room on the summit. The length of the hill is three and a half miles.

* A Sketch accompanies these notes.

The climate of Deoghur itself, which is situated on a level with the base of the hill, being very agreeable and cool, I cannot but think the summit of Teeur, 1,500 feet above Deoghur, must be more so.

THE SINGALEELAH RANGE; District.

DARJEELING in the HIMALAYAH MOUNTAIN.

Latitude North 27°, 14′ *to* 26°, 42′, *Longitude East* 88°, 18′ *to* 88°, ·06′.

Of the capabilities of this Sanatarium and of its superb climate, I believe nothing more can be said or written than has already been placed before the Government of Bengal; but I conceive it to be the duty of every one who has the opportunity of doing so, to add his testimony to the fact of the great importance Darjeeling is to the Government; and that the only remaining arrangement requisite to render it doubly so is the construction of a good road from the railway at Rajmehal to the foot of the hills, a distance of 150 miles. I believe that a good road to Darjeeling would be the means of causing a rapid increase of European settlers in the hills, a corresponding

spread of tea and coffee plantations, and of the establishment of schools and other social institutions that necessarily follow in the train of civilization.

A numerous and a prosperous Anglo-Saxon population situated in the Himalayahs, at so short a distance from our frontier, and at a moderate distance from Calcutta, would ever be an advantage to Government.

In the hill district of Darjeeling there are numerous spots well suited for Sanataria, besides the spur upon which Darjeeling itself is situated, and at the present moment when enquiries are on foot not only regarding Military Sanataria, but also for spots where European settlers may locate themselves for the purposes of cultivating tea, coffee, and cotton, I cannot do better than recommend the eastern flanks of the Singaleelah range for all the abovementioned purposes.

Singaleelah (birch tree; Tibetan) is a lofty meridional mountain or buttress of perpetually snow covered Kunchinginga, that separates Nepaul on the west, from Sikkim (both Independent and British) on the east, and which in any other part of the world would, from its great elevation and grand proportions, be considered as a range of mountains: its principal peaks are enumerated in the margin.

Independent Sikkim ..	Kunchinginga...	28,177 feet above the sea.
	Kubrah	24,000
	Gubroo	15,000
	Kunglanamo	13,000
	Sughoo	12,000
British Sikkim .	Singaleelah	12,329
	Phulloot	12,043
	Sandhukphoo	11,963
	Tongloo	10,080

From the summit of the snowy range to the plains along the crest of Singaleelah the distance is 65 miles, or the whole width of the Indian portion of the Himalayah mountains; but by the windings of the crest the distance is increased to 102 miles. This spur then is one-fourth of the whole length of the Alps, or one-half of the length of the Yura, with peaks exceeding either by 13,000 feet. Forty miles of the southern portion of Singaleelah belong to the English Government; this tract commencing at the Singaleelah peak, which is situated at the head of the Rammam river, 12,329 feet above the sea, extends to the plains. The whole of the eastern slopes of this great mountain with an approximate area of 72,000 acres, with an altitude ranging from 300 feet to 12,000 above the sea, presents numerous spots where Sanataria might be established, and where tea, coffee and cotton, be-

sides all the European fruits, vegetables, and other botanical productions, would each find its own peculiar and genial site.

The spurs descending eastward from Singaleelah are of great extent, one being six miles in length, two of twelve miles, and many of four and two miles in length. Here then is room for a large population that would form a powerful bulwark between Nepaul and Sikkim. There is every sort of climate from tropical heat to nearly arctic cold, with all the intermediate gradations. At the lower levels, cotton, tobacco, rice, and other tropical crops thrive, at a higher level would be grown, tea, coffee, English fruits and vegetables, so necessary to the health of Europeans; whilst the fine grass pasture of a still higher level would support flocks of sheep, cattle and goats. Whenever a clearance is made in Sikkim and English grass seed sown, there is produced a healthy and a bountiful pasture.

On Singaleelah water and fuel are abundant every where; an excess of large oak, fir, chestnut, olive and other timber trees being one of the great troubles of these hills. At any height above 4,000 feet elevation, the European constitution is safe from miasma: at any height above that, the European thrives and is long lived.

The scenery all along Singaleelah is magnificent, perhaps as grand as any in the world: from many points on this range, 200 miles of the snowy range with its enormous glaciers, are visible, distant from 100 to 25 miles; and within this view are the highest measured mountains in the world.

THE SARGOOJAH HIGH-LANDS, NAMED MYNE PAT AND JUMEERA PAT.

Latitude North 23° 40′ *to* 22° 50′ *Longitude East* 84° 10′ *to* 83° 40′.

About the year 1802, the British Troops having occasion to enter the then unexplored district of Sargoojah from Nagpore, in order to repress the repeated inroads of the natives from that country, it was discovered that one-third of the district was occupied by extensive and lofty Table Land, named "Paut" or Pât; the name of a village being generally affixed as a distinguishing appellation to each plateau, thus we have the Myne Pât and the Jumeera Pât, two plateaux that have been lately visited by Europeans, though not fully described,

In the year 1843 when engaged surveying the common boundary between the south-western frontier agency and the district of Behar, I met Colonel J. R. Ouseley, the then Governor General's Agent at Chota Nagpore, who had just returned from visiting the Myne Pât. He described the locality as possessing a charming climate, cold enough to render it necessary to wear cloth clothes during the whole of May; that there were many running streams on the summit, and an abundance of small timber; English flowers were common, and the grass very luxuriant, supporting large droves of wild cattle (Gour). In 1848 Colonel Ouseley casually alludes to this spot in the Asiatic Society's Journal in the following terms:—Extract from Asiatic Society's Journal, volume XVII, Part I, pages 67-68, January 1848. "On the antiquities of Sarguja" (Sargoojah), and its neighbourhood by Lieutenant-Colonel J. R. Ouseley.

"This country, (Sarguja,) is well worthy the attention of the geologist. Its coal, iron, gold, ochre, marble, lime, &c., are most valuable—the height of the inhabited parts above the sea from 1,500 to 3,600 feet—the climate cool, agreeable, and healthy—the scenery beautiful—rivers in every direction—woods and hills, on which are extensive Table Lands at about 3,300 feet in height. For the sportsman few places in India can excel this. The Gour abounds in deer of all sorts, wild buffaloes, elephants, tigers, in fact all, but the rhinoceros, of the animals of India."

"The period is not distant when I hope to see European colonization attempted. The Table Land of the Myne Pât extending for 50 miles east and west by 30 miles wide at an altitude of 3,300 to 3,700 feet, is admirably adapted for the speculations of Europeans. The native population is thin, there only existing sixteen inhabited villages in the whole Myne Pât Table Land, and not above 250 inhabitants (men, women and children). It is too cold for the people of the plains, about 1,200 or 1,400 feet below." This tract, which Colonel Ouseley styles Myne Pât, is the most westerly portion of the great plateau that extends from near the great bend of the Koyle river, in latitude 23°, 40′ and longitude 84°, to Belaspoor situated at the foot of the Myne Pât, in latitude 22°, 50′ and longitude 83°, 40′; the road from Ruttunpoor to Chota Nagpore passing through this village.

This plateau appears to be divided into two portions by a deep valley which separates Myne Pât from Jumeera Pât; but is nowhere correctly represented upon any of the existing maps of India.

Captain R. T. Leigh, Senior Assistant to the Commissioner of Chota Nagpore, visited Jumeera Pât or the eastern plateau, in 1856, and remained on the summit from March till August.

In the Journal of the Asiatic Society, No. CCLXII., No. III. of 1857, pp. 226 to 231, he describes Jumeera Pât as being in the district of Sargoojah, 100 miles west from Chota Nagpore, 100 miles south-west from Sherghotty in Behar, and 160 miles south-east from Mirzapore on the Ganges. There is a fair road from Chota Nagpore to Joormoo, eleven miles from the summit of the high land, that some of the steep banks of the water courses required cutting down to make the road fully practicable for wheeled conveyances during the cold weather. During the rainy season the streams are impassable from the great quantity of water contained in them. The ascent of the high land is in the present state of the roads impracticable, except to palanquins and doolies. Captain Leigh describes the summit as "a fine extensive Table Land, free from jungle, with the exception of some low shrubs on the more sheltered slopes."

This spot is 3,200 feet above the level of the sea and very extensive. The soil is three feet of black mould lying upon red gravel. At the depth of 40 feet dug in this gravel, rock was met with, but no water. Red earth is common. For water his party was dependent upon springs, which issued from the sides and at the foot of a small hill, upon which Captain Leigh had built a Bungalow. These springs did not dry during the hot weather, but greatly increased during the rainy season, fresh ones bursting forth. The nearest spring was half a mile distant.

The climate is described as follows :—

"With regard to climate, I annex a register of the thermometer, the accuracy of which may be depended on, as I noted it daily. In the hot season, as soon as the sun set, the air became cool and pleasant, and the nights were always cool ; natives sleeping in the verandah of the house at night used warm coverings even in the hot season. I had neither punkahs nor tatties during the time I was there, and I found that by keeping the doors shut and the room a

little darkened, the heat during the day was not very oppressive. The thermometer in the house did not, I think, range higher than 84 or 85°. A strong north-west and west wind prevails during the hot season. The rains set in at the end of May with thunder storms from the north-west, after which the prevailing wind was from the south and southes-wt. It very seldom blows from the east. After the rains had set in, there was very little variation in the thermometer from that noted in the beginning of June; and until I left in the middle of August, I never experienced that "mugginess" which is usual in the plains at times during the rainy season. Not having had a rain guage, I am unable to speak as to the quantity of water which fell, but I think that although the rain was at times very heavy, yet it was not so heavy or continuous as at some of the stations in the Himalayahs. Perhaps the few trees on the "Pât" may account for many of the clouds passing over without discharging their contents. At times there was a good deal of mist.

"I enjoyed good health during the time I was there, and the Sepoys and Office people who had been with me from the commencement of our residence there, were generally speaking, healthy. Some cases of fever occurred ; but as the Sepoys' lines and the Amlahs' houses were only barely finished when the rains commenced, they were of course damp, and to this may be attributed some of the cases of fever. Had the houses been dry, and had the people been able to obtain a regular supply of good food, I think that there would have been less sickness. It was, however, very difficult to procure supplies of good rice, doll, ghee, &c. as the Bunniahs who live in the villages below, have a great dislike to coming up to the "Pât" during the rains, and my efforts to establish a bazar failed. The natives of the adjaeent villages appear to be a very poor race, occupied in cultivating their land, from which they raise a coarse kind of rice, ("goradhan" and "gooudle" (millet,) &c. It was with difficulty that they were induced to come and labor in building the lines.

"From the experience I have had during a residence of 5 months (from the end of March until the middle of August 1860) at Jumeera Pât, I should be inclined to pronounce favorably of the climate. There is almost always a fine breeze blowing there ; and in the cold and hot weather a very hot wind from the north-west and west.

"The route by which I marched from Chota Nagpore is about 116 miles ; there is another and more direct road *viâ* Lohardugga and

Kot●m, (about 100 miles ;) but there is a very steep Ghaut near Kotam, and the road is, in many places, very hilly, and passes through a good deal of jungle."

The means of seventy-five thermometrical readings at Jumeerah Pât, taken in an open verandah to the north, are herewith appended.

Months.	Thermometer. Before Sunrise.	Thermometer. At 2 P. M.	No. of daily Observations.	Days of Rain.	Remarks.
March 1856..	66°	80°	6 days		From the 8th June no further register was kept; there was little variation from that marked in the beginning of the month of June; if any thing, it became a little colder.
April „ ...	73°	87°	30 „	4 also hail	
May „ ...	74°	86°	31 „	11 days	
June „ ...	70°	78°	8 „	6 „	

I have thought fit to mention this almost unknown tract as a fit place for temporarily locating European Troops in, in case circumstances should ever render it necessary for an Army to penetrate into this wild country. Our Troops have once visited it (1802), and may do so again; and far less accessible and less likely spots were occupied by our Troops in 1857-58. It is well therefore, that the existence of such spots should be placed on record, in case of future contingencies; as it would indeed be a relief to a Commander who of necessity might be located temporarily in the Sargoojah jungles, to know that an elevated and a healthy tract of land was in reach of his jungle-fever stricken Troops. These uplands, as they stand, are hopelessly out of the line of commerce, or of any line of communication; nor are they approachable at all seasons of the year. It was by this route however that the Mahrattas during the last century travelled across India, reaching to within a few miles of Calcutta.

W. S. SHERWILL, *Major,*

Boundary Commissioner.

INDEX

To Localities recommended as small Sanataria or small Convalescent Depôts for European Troops.

No. on Map.	Name of Locality.	In what District.	Latitude North.	Longitude East.	Elevation above the Sea.	Elevation above the surrounding country.	Remarks.
1	Beharee Nath Hill ...	Pachete South West Frontier Agency	23°34'	87°	1,473	1,100	
2	Maira or Maruck Hill ...	Monghyr ...	25°10'	86°32'	1,500	1,300	
3	Muhooa Gurree Hill, Southern Rajmehal Hills	Bhaugulpore ...	24°29'	87°27'	1,500	1,300	
4	Northern Rajmehal Hills	Bhaugulpore ...	25°14'	87°48' to 87°36'	1,500	1,300	
5	Parus Nath Mountain ...	Ramghur ...	....	....	4,483	3,583	
7	Teeur Hill	Beerbhoom ...	24°30	86°54'	2,000	1,500	
	Localities for large Sanataria.						
6	Rhotas Table Land ...	Shahabad ...	24°37'	83°50'	1,490	1,190	
8	Singaleelah range, Himalayah Mountains.	Darjeeling ...	26°42' to 27°14'	88°10' to 88°06'	from 12,000 to 300		
9	Sargoojah Table Land, Myne Pât and Jumeera Pât —	Sargoojah South-West Frontier Agency ...	23°40' to 22°50'	84°10, to 83°40'	3,700	3,000	

(True copy)

(Signed) F. R. BOYCE,

Asst. Secy. to the Govt. of Bengal, in the Public Works Dept.

From G. U. YULE, Esq., C. B., Commissioner of the Bhaugulpore Division, to Lieutenant-Colonel C. B. YOUNG, Secretary to the Government of Bengal, in the Public Works Department,—(No. 228Ct., dated the 22nd February 1861.)

I HAVE the honor to inform you that I ascended the Mahooagurree hill, in the Damun-i-Koh, on the 18th January last, taking with me all my establishment, cutcherry, carts, elephants, horses, &c., and remained there enjoying the fresh air and beautiful views until Thursday. I took the road up on the south side from the Nargunge Bungalow, and had no difficulty, except a little with the carts at one or two steep places on the road, which might easily be turned and sloped off. This south road, though the only one existing for carts, is a very long way, more than fifty miles from the nearest points of the rail, as the whole hill has to be turned to reach it. There can be no difficulty, I should think, in making a cart road upon the north side, which is only thirty miles from Mooradoi station.

2. I have already reported to you (some time in August last, I think,) on this hill; and in January 1860 I caused a brief account to be inserted in the *Friend of India* of my visit to it in the December preceding. Captain Layard who joined me on the hill last month, has also sent you a full report on the subject, and I will not therefore trouble you with many observations.

3. I would solicit you to ascertain the real height of the hill above the sea: Major Sherwill's map gives it as 1,600 feet, but does not say whether this is above the sea or above the surrounding country. Now I find in another Survey map that Teeur, a hill not very far from Mahooagurree, is marked as 1,500 feet; but on turning to Major Sherwill's printed account of Deoghur, it is seen that this is the height above the base, and that the height above the sea is 2,500 feet. A difference of 1,000 feet in the height above the sea is of no little importance. I doubt however, whether Mahooagurree will do as a Sanatarium; it must be very hot during the day time in the hot season, and damp in the rains,—as a pleasant healthy residence for Bengal, as a change from Calcutta and the plains, it is delightful. The air is so light and fresh, the view so extensive, and the nights so cool, I believe at all seasons, that if a good road were made from the rail, which could easily be done, I am sure residents in Calcutta would soon take to having country houses on this hill. Wood, stone, lime, bamboos, water, level ground for building and for gardens, and for many

miles of road, all exist. The soil is rich, much is cleared, and clearing is not expensive. The view extends to Parusnath on the west, the Ganges on the east, the Monghyr hills on the north, and the plains of Beerbhoom on the south, with all Sontalea between.

4. I have directed Mr. Taylor, Assistant Commissioner of Doomka, to erect a small Bungalow on the hill, at a cost of not more than 50 Rupees, to accommodate travellers who cannot conveniently bring tents, and I would recommend that one on a larger scale with a few sheds be sanctioned and built, that every means be taken of diffusing the knowledge that such a place exists within twenty-four hours of Calcutta, and every encouragement be given to people to visit it; that all applications for sites be made to Mr. Taylor, and that when enough applications, say ten or fifteen have been made, that an Engineer Officer be sent up to make a road up from the north side, and lay out the top of the hill with main roads and such ground as should be retained for public use and native bazars, at the same time marking off the building sites required on some regular principle, so as not to allow one site to interfere with the access of another, to water main roads, &c., and not to give above a certain extent of ground to any.

5. Mr. Taylor could settle the compensation to be paid to the Pahareeas for the loss of such cultivated land as might be taken, and for the removal of their few small villages to places where they would not be in the way of the new settlers, the sale to whom of the building sites at prices to be fixed hereafter would of course pay for all expenses.

Memorandum from Lieutenant-Colonel C. B. Young, Chief Engineer, Lower Provinces, —(No. 5885, dated Camp Sulligram, the 18th February 1861.)

Forwarded in original, with enclosure, to the Secretary to the Government of Bengal, Department Public Works, for information.

From Captain F. P. Layard, Superintending Engineer, Northern Circle, to the Chief Engineer, Lower Provinces,—(No. Y., dated Camp Sulligram, the 27th January 1861.)

Report called for.—In a letter No. 5205, dated the 26th December 1860, from the Secretary to the Government of Bengal, in the Public Works Department, I was directed to report on certain locali-

ties in the Rajmehal hills, which, in the opinion of His Honor the Lieutenant Governor of Bengal, might be suited for the purposes of Sanataria, or as convalescent depôts for a limited number of European Troops.

Reasons for first visiting Mahooagurree.—2. From the tenor of the letter above quoted, it would appear that the localities on which I was called to report, were confined to the Maira or Maruk hill, thirteen miles south of Monghyr and the north-eastern extremity of the Rajmehal hills, overlooking the Gangetic valley; but as Major Sherwill, in the concluding paragraph of his report on the Rajmehal hills, forwarded for my information and guidance, specially notices the Mahooagurree, still as a very cheerful and in other respects suitable spot, I have considered it best to visit that locality first, and now submit my report.

Mr. G. U. Yule, c. b., *Commissioner of the Sonthal Pergunnahs, the first to bring prominently to public notice the capability of Mahooagurree as a location for Europeans.*—3. I may also state one urgent reason for first directing my attention to the Mahooagurree hill arose from learning that Mr. G. Yule, c. b., the Commissioner of Bhaugulpore division, and Sonthal pergunnahs, was at the time on his annual tour through the hill country, and being, I believe, the first Officer who had prominently brought to public notice many months ago, in an article in the *Friend of India*, newspaper, and subsequently through Government, the great capabilities of the hill in question as a location for a European settlement, I felt convinced I could, through his kindness, obtain much information and valuable assistance in my report.

Report on the Hill.—4. The peak generally known as the Mahooagurree hill is, according to the Revenue Survey, published in 1848-50, 1,655 feet above the level of the sea, and formed one of the principal stations of the Grand Trigonometrical Survey; its latitude being laid down as 24° 29′ and longitude 87° 27′. Major Sherwill is in error in supposing it to be a fine flat bluff of sandstone; it is on the contrary a conical peak, unsuited for many reasons, which I will give hereafter, for the location of Troops. Major Sherwill, however, may include, under the name of Mahooagurree, a succession of hills forming one continuous range with ample plateau land, including the Domayr hill,

and the plateau on which stands the small hill village of Pookurrea, a length of about six miles, as shewn in the accompanying Sketch map. The village of Mahooagurree is at the foot of the peak towards the south.

Reason why the Mahooagurree Peak is not suited as a location for Troops.—5. The peak itself, although the most lofty, and commanding a magnificent view of the surrounding country from its formation, affords no room for the construction of buildings suitable for a body of Troops.

No plateau land—and a great distance from water.—6. There is no plateau land at or near its summit, and its great distance from water would be a most serious objection. It is overgrown with thick forest trees, excepting on the east side, where a slight clearance has been made for the cultivation of millet.

Building materials not procurable on the spot.—7. Stone and lime for building purposes are only procurable from long distances down the hill, the sandstone and basaltic formations apparently underlying a topping of laterite.

Want of ground for Soldiers' Gardens.—8. Another subject which I thought worthy of consideration, was the great want of ground on which Soldiers' gardens can be established, and a small level plain for cricket and other amusements.

Idea of the Peak as a location for Troops abandoned.—9. The great cost of constructing a temporary practicable cart road to the summit, would also be a serious drawback. For the above reasons I gave up all idea of the Mahooagurree peak as a suitable location for Troops.

Site recommended.—10. The site which I would most strongly recommend is the hill on which, on the 20th instant, I found pitched the camp of Mr. Commissioner Yule, C. B., and Mr. William Taylor, the Assistant Commissioner from Doomkee, shewn on the accompanying Sketch map. It stands about two miles in a south-easterly direction from the peak near the small village of Pookurrea, and commands a grand panoramic view of the Damun-i-Koh, Bhaugulpore district, and the Gangetic valley to the north and east, and on one occasion the distant

Situation.

hill at Parusnath was also distinctly visible: its height above the sea cannot be much less than that of the peak.

Building Sites numerous.—11. Its capabilities as a location for convalescent Troops are very great. The numerous platforms and plateaux for building sites are varied and beautiful. The jungle round has been much cleared and under cultivation, and, as far as I could learn, the place is healthy.

Water procurable.—12. The great desideratum, water, is procurable in abundance at and near Pookurrea village; also at Mahooagurree village there is a fine spring gushing from the basaltic lock yielding about twenty gallons per minute. I am assured that it never runs dry throughout the year. The water is beautifully clear and sweet. I have forwarded to you for analysis a bottle of the water from this spring, which I have marked No. I. on the map.

13. I forward also a second specimen of the water from spring No. II. at Ambhara village; this and other springs I have marked on the map, give about five gallons per minute.

Reservoirs required.—14. The construction of reservoirs at all these watering places would be simple and easy; and plunge baths might also be run up at very little expense with a continual supply of fresh running water.

Building materials procurable.—15. Should it hereafter be found advisable to construct permanent buildings, sand, stone, and lime are to be found at short distances.

There is a scarcity of large timber; but saul, mohawa, and asun logs, from sixteen to twenty feet in length, and from six to eight inches in diameter, are procurable on the hill. Bamboos and grass for thatching purposes are to be had in abundance; and there appeared to be no difficulty in collecting labour for the construction of any temporary erections in wattle and dab.

Thermometrical observations.—16. The air at the summit of the hill appeared pure and refreshing, and the feeling experienced from the cool breeze, exhilarating and pleasant after an ascent from the plains. The variations in the range of the thermometer exposed to the sun were less abrupt than those of the plains. The highest range in the plains between the 15th and 25th instant was 110° at the

hottest time of the day, about 2½ o'clock, whereas during the four days we were on the hill 92° was never exceeded. We had the advantage, however, of a refreshing shower on the night of the 19th instant, which greatly cleared the air. The thermometer stood at 98° on that date in the plains.

17. The mornings at sunrise were delightfully cool, with the thermometer at 50°, and the water five degrees colder, but in the valley below at Sulinghee village, the range was as low as 33° at sunrise on the 24th, and the wet from the dew and spilt water on a table exposed to the air, froze at once. This would appear to bear out my supposition, that the variations of temperature on the hill are not so sudden and trying as they are on the plains.

18. I speak diffidently on this subject, knowing that Dr. Balfour, Superintending Surgeon, from Dinapore, has just visited these localities, and has no doubt made professional and searching enquiries into sanatory questions.

Recreation for Troops.—19. In locating European Troops in hill stations, the means of affording amusement and recreation to the Soldiers should not be forgotten, and although at first the fine and extensive views may form subjects for cheerful and pleasing conversation, yet after a time the sameness would weary, and other means would be sought for passing away the time, independent of the view and the collection of insects and reptiles; and for this reason I was anxious a site might be found where gardens and recreation grounds could be combined.

20. This can be most fortunately secured near Pookurrea village, in a charming little hollow somewhat more than a quarter of a mile in extent, where the soil is excellent and water close to the spot. Gardens, skittle sheds, fives courts, and cricket ground, might be established on this ground with ease. Indeed, should there be any intention of sending Troops up next cold season on trial, I would strongly urge a small sum being expended in sending up a gardener with assistants, and a good supply of vegetable seeds in November next, and that a garden be at once established.

Difficulties of access.—21. The greatest drawback to the selection of the Mahooagurree hill lies just now in the great difficulty of access. The only practicable cart road made by the hill people runs

from the village of Nargunje to Pookurrea, about eight or ten miles in length, by a circuitous route, and in some places very steep, up the Koorchao hill. All Commissariat supplies would therefore have to be sent *viâ* Doomkha and Synthia, if forwarded from Calcutta.

Time of access by Cart Road.—22. Mr. Yule's camp marched from Doomkha *viâ* Nargunje to the summit. The carts took about five hours to reach the foot of the Koorcha spur from Nargunje, but were detained three hours in ascending the steep declivity to Koorcha villages, and did not reach Pookurrea camp till the evening. The party on elephants and horses made an easy ascent in three hours.

My ascent.—23. Having come by the Bhaugulpore and Bowsee road through Hansdhia to Noni, I ascended from Kendroa bazar side with Mr. Charles Barnes, having left Noni about noon, passing through Sarmi and reaching Kendwa Bungalow in the evening. The whole route (with the exception of one narrow belt of jungle) running through a highly cultivated country.

24. My carts were compelled to go round *viâ* Nargunje, sixteen miles, but reached Mr. Yule's camp in the evening on the summit of the hill. We made the ascent partly on foot, and partly on an elephant, passing through the villages of Simra and Ambhara, directly up the western face. The path was very steep from the foot of the Chuprye hill to Pookurrea, and took us somewhat more than one hour and three quarters.

Descent.—25. On the 24th January the whole party descended on the northern face to Sulinghee, the carts having been sent on the previous day *viâ* Nargunje and Kendwa bazar, through the western opening of the Bansloi valley, erroneously called the Puckwara Pass, there being no spot whatever which can be termed a "Pass." The ascent was very precipitous, though accomplished by the elephants, Mr. Yule and party walking down. I attempted to descend on an elephant, but was glad to get off and walk. The time taken in descending was about ¾ of an hour, after which a mile or two of pretty fork-like scenery brought us to the Sulinghee Bungalow, on the banks of the Bansloi.

26. I visited many spots in company with Mr. Yule, and the Assistant Commissioners, Messrs. Taylor and Wilmot, all well acquainted with the country, to select a line for a cart road on the

northern and eastern faces, accessible from the railway, from Mooraoree station near Pulsa, and I believe we all at last concurred in recommending that the ascent would be best made with the easiest gradients and the least cost, by the spur running down to Sulinghee village, a distance of about three miles from our camp on the hill.

Cost of Cart Road up the Hill.—27. The cost of cutting a practicable cart road would be about 500 Rupees, and Mr. Alexander Eaton, of Pulsa, an old resident and owner of several coal mines in the neighbourhood, who formed one of our party, would, I believe, undertake to open the line for that amount.

Road from the Railway.—28. The present cart road from the Mooroaree station, a distance of about thirty miles, should be properly lined and widened; and if metalled ten feet in width, would be done, inclusive of temporary bridging, for Rupees 1,000 per mile. The line should be kept to the right bank of the Bansloi, so as to avoid the crossing of the river.

29. Mr. Yule has long had an impression that a canal might be most advantageously opened along the Bansloi valley to the station, and from my recent inspection of the country, I see no difficulties in an engineering point: the fall of the ground to Ameerapoora, at Khooshkirie Bungalow does not apparently exceed eight inches in the mile, and beyond, nearer Pulsa, about six inches. There would be an ample supply of water for headway and surplus, as well for irrigation purposes; and I feel confident that with the coal mines at work in its immediate vicinity, and the produce of the highly cultivated country through which it would pass, the Bansloi canal would be a very paying undertaking.

30. I must in conclusion express my acknowledgments of the great kindness and assistance I have received from Mr. Yule and the Officers under him: without their influence and the use of Mr. Yule's elephants, I could not have explored the hills so fully or satisfactorily as I have done. Owing to the denseness of the jungle, and the fact of tigers and leopards frequenting the hills, it would scarcely have been prudent or safe to have ventured alone and on foot, through the mountain paths.

Memorandum from Lieutenant-Colonel C. B. YOUNG, Chief Engineer, Lower Provinces,—(No. 6163, dated the 2nd March 1861.)

Forwarded in original, to the Secretary to the Government of Bengal, Department Public Works, in continuation of this Office docket No. 5963, dated the 21st ultimo.

From Captain F. P. LAYARD, Superintending Engineer, Northern Circle, to the Chief Engineer, Lower Provinces,—(No. 539, dated the 21st February 1861.)

Report on Maira and Maruk Hills.—In continuation of my former report No. Y., of the 30th January 1861, and No. 507 of the 11th instant, with reference to letter No. 5205, dated the 26th December last, from the Secretary to the Government of Bengal, in the Public Works Department, I have the honor to report, that I have now visited the hills of the Koruckpoor range, south of Monghyr, which have been considered by Major W. S. Sherwill, Boundary Commissioner, as suited for the purposes of Sanataria or convalescent depôts for European Troops.

Maira and Maruk two distinct Hills.—2. From the extract from Major Sherwill's report forwarded for my guidance, it would appear that the principal locality to which my attention was directed, was a hill indifferently named Maira or Maruk, but I found that the names identified two distinct hills.

3. It appeared curious to me to find at Monghyr how very little was really known about these hills, and how very few had apparently visited them, although only a few miles distant, and abounding in beautiful and varied scenery, far more interesting and pleasing than any I have before seen during my recent tour through the Rajmehal range.

Route from Monghyr.—4. Through the kind assistance of the Officers connected with the East Indian Railway, I first proceeded along the line to Itwa, a distance of about ten miles south-west from Monghyr, from thence I continued my journey southward to the little village of Maruk, through low cultivated land, for about four miles, and then through a belt of thorny Terai jungle, for three miles along a cart road.

5. The whole base of the hill seems surrounded with this scrub and thorn jungle, intermixed with patches of coarse grass, and abound-

ing in game of all kinds. There are very few villages near the foot of the hills, and cultivation consequently scarce.

Village of Maruk.—6. The little village of Maruk, consisting of six or seven huts, lies imbeded in a hollow surrounded by high precipitous hills, in some cases towering above in one huge mass of perpendicular rock from 600 to 700 feet high. This little hollow or *cul-de-sac* rather, is approached from the north, passing near the small village of Caraila through a gorge called the Puchoorkhi Ghât. The scenery was very lovely, and as the sun was hidden behind the overhanging rock for the greatest part of the day, the feeling of coolness and shade was most refreshing.

Water supply.—7. A small stream giving from four to six gallons of water per minute, falls down a very pretty rocky ravine at the western end of Maruk hill, and loses itself in the ground at its immediate foot. This is the only spring of water in the neighbourhood, and consequently the resort of all the cattle, as well as I may say of all animal life in its vicinity.

8. The ground about the little village of Maruk is covered with the debris of former slate works, consisting principally of flat circular shallow plates, half and broken pieces of which strew the soil in all directions. I could learn nothing from the villagers as to the time when these works were carried on, excepting that it was very long ago, which is probably the case, as I do not recollect to have seen plates of this description in present domestic use.

Timber procurable.—9. Maruk village is now a depôt for storing timber logs and bamboos purchased by a merchant in Monghyr, by barter for rice with the hill people. The timber consists principally of logs about twelve or fifteen feet in length, and from four to six inches in diameter of augur, kussumbhur, dhamin, sakna, and dan wood, as well as a few larger logs cut to the scantling and length of railway sleepers. The timber is cut and peeled on the hill tops, and dragged to some almost perpendicular slides, from which it is allowed to glide with a noise like the reports of musketry to the bottom of the glens.

Bamboos for thatching, &c.—10. The bamboo in these hills is much smaller than that on the Rajmehal and Damun-i-Koh hills, at least near Maira or Maruk, it is barely an inch and a quarter in diameter, of short length, the hill men sell it at Maruk at the rate of from

ten to thirteen bundles of twenty each per Rupee, or rather barter them for grain to that amount, it is then carted to Monghyr, and sells at three bundles or sixty bamboos per Rupee.

Maruk Hill.—11. The Maruk hill immediately overhangs the village to the south; its elevation is considerably lower than Maira, and can be ascended by a steep precipitous path in little more than half an hour. It is far too low to be thought of as a Sanatarium, and being merely a ridge without plateau land at its summit, there would be no space for building purposes. I have before mentioned that a good supply of water is near at hand, and this is the only thing to be said in its favor.

Maira Hill.—13. The Maira hill lies to the eastward of Maruk about two miles distant, and is, as described by Major Sherwill, a flat-topped hill, about 1,500 feet above the sea level. An easy walk of two hours from Maruk took me to the summit up a very precipitous path through continuous jungle without any intermediate patches of cultivation, such as one meets with on the Rajmehal hills, and indeed from the rocky nature of these hills, and the scantiness of soil, I doubt much the possibility of cultivating them.

Space for building purposes and material.—13. Major Sherwill describes the extent of plateau land at the top to be about a quarter of a mile in length by one hundred yards in width. From the thickness of the jungle, I could hardly judge of this, but have no doubt the extent given is correct. There is evidently sufficient space for one small barrack with out-offices; but the expense of constructing anything beyond mere temporary buildings would be very great. The timber procurable is small, in scantling and length, and scarce; and lime must be brought from a long distance. At Itwa, on the railway, I found nodular limestone for lime burning, was all brought from Monghyr. I conclude therefore there are no limestone formations near this hill.

Supply of water too distant—Hill too steep for Invalids to ascend on foot.—14. The greatest drawback is the want of water which can only be procured from the foot of the hill, at a distance of two miles; and the present paths are so precipitous that I am convinced no convalescent, unless at a very advanced stage towards recovery, could ascend and

descend the hill on foot. There is no room on Maira for gardens, and the rocky nature of the ground would even appear to be against them. The amusements therefore of invalids and convalescents would be very cheerless and circumscribed.

No room for Gardens.

15. For Commissariat purposes, provisions of all kind would have to be forwarded from a distance, the very few villages at the foot of the hill affording little or no supplies of any kind beyond a few fowls and a little milk, principally from buffaloes.

View from the summit.—16. The view from Maira must no doubt at some season be very beautiful and extended, but during my visit it was very limited, owing to the usual dreary haze at this season: all that could be seen was the low belt of jungle at the foot, with a few miles of burnt up remains of rice fields beyond, and now and then a glimpse of the Ganges.

Temperature.—17. The heat at the summit was very great, which I attribute partly to the nature of the ground, composed as it is, of rocks of laterite formation, and a red soft clay of a vermilion color, almost too bright for red ochre. The following were the ranges of the thermometer in the sun during the time I remained on the hill:—

At 10-30 A. M.	...	..	88 degrees.
At 11	...	...	92 ,,
At 11-30	..	...	118 ,,
At 12 noon	..	..	120 ,,

at the same hour, in the shade, it fell to 82 degrees, with a strong westerly wind blowing.

Climate.—18. At the foot of the hill to which I again descended in a northerly direction by Chowa Ghât, the thermometer at two-half P. M. was at 100 degrees in the sun, there can thus be, if any, very little difference in temperature. The hill men informed me that during the rains the climate above was very cool and pleasant, and they said healthy, but that during the hot months of March, April and May, the heat, except in the ravines and glens, was very great; and this I can well imagine, from my experience during the 18th instant, and the satisfaction I felt in reaching the little village of Maruk, imbedded in the hollow where my tent was pitched.

Cannot recommend either Hill for Sanataria.—19. I cannot, from what I have seen of either Maruk or Maira, recommend them as fit places for the location of European Troops: the change of temperature between their summits and that in the plains, is too slight to be of any consequence in renovating the health of men suffering from the effects of a barrack life in the plains; indeed, I may make the same remark in respect to all of the hills I have lately reported on in Bengal. As a change, there can be no doubt that a run of a month or fifteen days amongst such pleasing scenery as can here be found, would do us all good, and I have no doubt as soon as the rail is opened, Maira, Mahooagurree, and the Motee Jhurna Falls will be far better known, and more often frequented than they have hitherto been. I can fancy no more delightful change for any one from Calcutta with a few leisure holidays, than a few hours' run up by rail to Itwa, a seven mile walk to the foot of Maruk hill, and a week's wandering and shooting amidst its beautiful scenery.

20. I trust in this and my two former reports, I have entered into all such particulars as will enable His Honor the Lieutenant-Governor to form an opinion on the advisability, or otherwise, of establishing locations for Europeans in the Rajmehal and Kurruckpore hills. I can only regret that other heavy duties have necessarily made my visit to the hills hasty ones, from which I fear I may have overlooked many points which might hereafter be considered of importance.

From Captain F. P. LAYARD, Superintending Engineer, Northern Circle, Lower Provinces, to Lieutenant-Colonel C. B. YOUNG, Chief Engineer, Lower Provinces,—(No. 507, dated the 11th February 1861.)

Report called for on the Rajmehal Hills as Sanataria for European Troops.—Again referring to letter No. 5205, dated the 26th December last, from the Secretary to the Government of Bengal, in the Public Works Department, with enclosures, calling for a report on localities in the Rajmehal hills, suited for the purposes of Sanataria or as convalescent depôts for European Troops, and in continuation of my report No. Y., dated the 30th ultimo, on the Mahooagurree hill, I have now the honor to report on the localities alluded to in the 4th paragraph of the letter above quoted, lying along the north-eastern extremity of the Rajmehal hills.

2. My first attention was directed to such hills as from their height and copious supply of water might prove the best suited for the location of Troops. I therefore encamped for three days at Goohâi, a small station in the East India Railway, about a couple of miles to the south-east of the Mote Jhurna water-fall, from whence I was daily able through the kindness of the Officers connected with the railway, to run up and down the line, ascending such remarkable spots on the hills as, in my opinion, appeared likely to afford facilities for the purposes required.

Forwards Survey Map of the Damun-i-Koh.—3. The accompanying survey map will show pretty nearly the spots visited ; but in many instances the names of some of the villages and peaks have been omitted, for the localities may have borne different names at the time the survey was made.

Ascent by Mr. Pontet's Cart Road of the Mussuha Hills.—4. I first ascended the Mussuha hills by the so called cart road made some years since by Mr. Pontet, formerly the Superintendent of the Damun-i-Koh, running from the Rajmehal and Colgong road about half a mile to the south of an Indigo Factory, and across the railway a mile or so south of Hurrunkola, and continuing through the heart of the hills to Burhait.

Features of the Hills.—5. The ascent is in some places very steep, and only fit for the small, peculiarly formed two and four wheeled hill carts, whose wheels are composed of solid masses of timber, mortised together. The varying features of the Rajmehal hills have been so fully described by Major Sherwill, in the report published in the twentieth volume of the Asiatic Society's Journal, that there is no occasion for my again noticing them. The same jungles of bamboo, mowa, jehul, jack, and mango trees prevail on these hills as at Mahooagurree ; but the open cleared spaces under cultivation by the hill men are more frequent, and I had consequently better opportunities of seeing localities which would afford ample space for barrack-building purposes, but in no instance did I see any Table Land such as exists at Mahooagurree fit for gardens or cricket grounds ; however, these may occur in places still covered with jungle.

View from Hills.—6. The view from Moondhi or Mooli hill is extensive, and I have no doubt, during some seasons, must comprise a range of many miles ; but during my visit on the 5th instant, a strong westerly wind was blowing, filling the air with a dusty haze, confining the view to a few miles of low dreary waste of land below the hill, and an occasional glimpse of the Ganges to the eastward. I saw several sites on this hill as well as on three other high points, on which room for buildings could be found, *viz.*, on Jhapse Puhar, Bhurrun or Bhowa, and Chundi Puhar ; but the supply of water is very limited and somewhat distant.

Notices sites for buildings.

Supply of Water.—7. The ravines between the points above named all contain small springs, furnishing at the time of my visit a supply of water running about one gallon per minute. I forward for analysis a specimen of the spring near the village of Kuchouri. The water is pleasant and refreshing to the taste, but I was informed by a gentleman, who has resided on the railway for some years, that after being left to stand for a short time, this hill water shows a greasy, shining appearance on the surface. This may probably arise where it may have passed over or through decayed vegetable matter.

Temperature.—8. I found very little difference in the range of the thermometer at the summit of these hills and in the plain below. At 9½ A. M. the mercury rose to 88°, but the air nevertheless felt cool and refreshing. In the dells and ravines the feeling of coolness was very pleasant, and the thermometer at "summer heat" with the water in the springs five degrees lower.

Westerly Winds in February and March, unhealthy.—9. Towards noon on the 7th, as the high westerly wind rose, the cold, damp sensation of the wind with the hot sun above was peculiarly unpleasant, and caused a shivering aguish feeling, which I am sure cannot be healthy, but I am told this is only felt when these high winds blow from the west, about the middle of February to the end of March.

Building Materials.—10. Materials for rubble stone masonry are abundant on the hills, and ghooting or nodular limestone of excellent

quality is procurable at the foot. Timber of a large kind is procurable about two miles to the west of Moorli Puhar; but it can only be transported in small logs scarcely of sufficient length for roofing purposes, owing to the difficulties in ascending the road. Sakua and jack-wood logs can be got, but not larger than from ten to fourteen feet in length. Bamboo and grass are to be had in abundance. All labor for building must be brought up from the plains, excepting for cooly work and collection of material.

Condition of the Hill men.—11. A great change seems to have come over the Puharias or hill men, since Major Sherwill's visit to them. They appear now to be inclined to work and earn money, and I was informed by a Native overseer on the railway, that he had employed some hundreds on his works. They are very independent, and cannot brook abuse or ill treatment.

12. Their condition from the vicinity of the rail must also have much improved, as the state of almost complete nudity amongst the men described by Major Sherwill is seldom now seen. All appear to possess clothing, and many of the head men were cleanly and picturesquely covered in cloths of bright colors. The neatness and cleanliness of their little villages was remarkable. I was on several occasions entreated to solicit Government to have schools established, particularly at Kachouri village; the head man named Rai Manjee, was most urgent in this request, backed by all his family and relatives, and I therefore consider it a duty to notice it for the information of Government.

Request by the Hill men for the establishment of Schools.

Healthiness or otherwise of the Hills.—13. It is most difficult after a mere passing visit to offer an opinion on these hills in a sanatory point. They are, comparatively speaking, very low, none higher than 1,400 feet above the sea level; they are now almost covered with dense jungle, and at their eastern base lies a Terai of low swampy land containing water in an almost stagnant state during six months in the year.

14. It is too well known how fatal the climate at the foot of the hills has proved to the European employees of the railway, who have so gallantly and successfully overcome all difficulties in the great

work, what therefore might be the effect on European Troops, a few hundred feet above can only be surmised until a trial is made.

Site for location above Mote Jhurna Fall.—15. Above the Mote Jhurna Fall there is Table Land near a small Sonthal village called "Banjhi;" but though offering a good site in many respects for the location of Troops, yet the ascent is so very steep, that a road to its summit is absolutely necessary. There was very little water in the cascade during my visit, but in the rains the water-fall must be grand.

16. Chudwa or Gudwa hill is another fine elevated point, but there is no water within a reasonable distance, and the ascent is very steep; the jungle most dense. At the back of Gudwa is a hill called Durkhale; there is a spring of water, but the view is limited.

The best site at Khurrun Puhar. 17.—The best site I visited in every respect was the Khurrun Puhar hill, above the railway station of Sahibgunge; a fine high plateau overlooking a magnificent extent of country, with a good spring of water called the Baluk Nuddy, about half mile east of the village of Garum or Karumby. This spring gives at least 100 gallons per minute, and runs through many fine natural reservoirs, and is beautifully clear and sweet to the taste. I have forwarded a bottle containing a specimen of this water for analysis.

18. The only drawback to the location on this hill is the want of a cart road, but this could be made without engineering difficulties of any kind, by a gentle gradient along the spur passing by the village of Solatokh, a length of about three miles.

19. Troops could alight from the rail at Sahibgunge station, at the foot almost of a spur of the Kurrun hill, and in three quarters of an hour would reach the summit by a steep hill path. If an experiment is to be tried, there will be no difficulty whatever in procuring material for temporary buildings.

20. In closing this report, I must express my thanks to Mr. W. Auley, whose residence and duties on the East India Railway at Sahibgunge, enabled him to afford me much kind assistance, and an intro-

duction to Mr. Simon, a resident of eighteen years on the Gungapersad hill at Tikreegunge. This gentleman accompanied us to different points on the hills, and gave me much information.

21. From Hurnkhola I was accompanied by a very intelligent young Native overseer of the East India Railway, Baboo Gobind Chunder Dutt, who, from a residence of seven years in that vicinity, and an acquaintance with the hill men, was very useful to me.

22. I have tinted in red the line of hills visited by me, and forming the subject of this report.

From G. U. YULE, Esq., Commissioner of the Sonthal Pergunnahs,—(No. 18, dated the 16th February 1860.)

SUBMITTED with accompanying Sketch to Lieutenant-Colonel Young, with reference to his letter No. 5206, of the 26th December last. I need add nothing to Mr. Braddon's description of the hill itself, and shall only say, that a situation more remote from all main roads or large stations is not to be found.

From E. N. C. BRADDON, Esq., Assistant Commissioner, Sonthal Pergunnahs, Deoghur, to the Commissioner of the Sonthal Pergunnahs, Bhaugulpore,—(No. 53, dated the 5th February 1861.)

IN accordance with your Office memorandum No. 4, endorsed on the letter No. 5206, of the Secretary to the Government of Bengal, Public Works Department, I have the honor to report on the subject of the Teeor hill, as follows:—

2. The Teeur hill, or rather range of hills, is of an irregular horse-shoe shape; of which the range shewn in outline in Sketch No. 2 is seen from the west, and the peaks shewn in Sketch 1 from the east. The tract of country lying in the bay of these hills is mostly jungle; but the Ghatwal of Teeur has a Kumar there, the cultivation being irrigated by a bund supplied from springs in the hill.

3. The highest peak A in Sketch No. 2 forms the apex of the horse-shoe, and is 1,500 feet above the plain. Of the range of small hills diverging from it on the western side, none is as much as half this height, but of the range running on the eastern side one peak, the extreme one to the right in Sketch No. 1, is about 1,200 feet, and the others about 1,000 feet. The country generally around the hill is open and cultivated. To the south only is there any jungle.

4. When I proposed to the natives of the neighbourhood to ascend the hill, they informed me that to reach the highest peak would take the whole day, and I accordingly went prepared to spend the night on the hill. My guides, Naya Paharcas, who go up the hill to cut firewood, &c., were able to shew me the road, as far as the Moholees go to cut bamboos, some 1,200 feet only, and the remaining 300 feet we had to ascend by whatever road we could discover.

5. As far as the Moholees go, the pathway was tolerably steep, and lay over large steps of rock. From the point where this pathway ceased to the summit, we had to make our way along ledges of rock which gave little hold for safe footing—over immense masses of rock that took no little climbing to pass—through gaps left between blocks of stone, which scarcely afforded room for the passage of our bodies—but never over a road that is, or could be made practicable, unless at an expense wholly incommensurate with the object to be gained.

6. The summit of the highest peak consists of one mass of smooth sloping rock, about 100 feet in circumference, to stand on which is no little trial to the nerves of any but an experienced Alpine traveller; and where the eye of an eagle would be a far more appropriate structure than a Sanatarium.

7. Besides the highest peak on which I stood there are two others, (the 3 forming the peak as seen from the plains in No. 2) of about the same elevation; one of the same character as that on which I stood, the other as shewn in A Sketch No. 1.

8. It will be readily seen then, that as far as the summit of this peak is concerned, there is no room for any building; and the steep

sides, composed mostly of precipitous masses of rock, as shewn in Sketch 3 A, afford no better place.

9. My search for water near the summit was also attended with no success. The nearest supply to be had is from a small spring which flows from the rocks some 500 feet below the summit; this, although the source of the river More, would not afford water for more than a dozen people at the present season, and in the hot weather is said to run almost dry.

10. Having ascertained so much in regard to the main hill, I returned to camp, reaching at 3 P. M., the journey up and down having taken 7 hours only.

11. Some days after this I went up the second highest peak, C in Sketch No. 1. The ascent was steeper even than that of the first 1,200 feet of the great peak, but there were not the same difficulties near the top. The path consisted of the same large steps of rock, and passed through some places of pilgrimage, not very numerously visited. One of these is the Tirkootnath Mohadeb near the foot of the hill, one a cave about half way up called Ajoogasap, and the third a cave called after Ramlochmun. These caves are worth seeing, formed by large ledges of rock lying on supports of the same; the larger measures fifty feet in length by twenty-five in breadth, and the smaller one is not much less.

12. On the top of this hill I found a small strip of Table Land, about 200 yards long by eighty wide, but even this is broken by masses of rock many tons in weight. The only water to be found near this peak is about 400 feet below the summit, very difficult to get at, and very insufficient in quantity, drying up like the other stream above mentioned in the hot months. The road up the hill is attended with the same objections as that up the highest peak; it would cost an enormous sum, and would bring no proportionate advantage.

13. The Sketch No. 3 taken from this peak will, I hope, convey some idea of the character of the hills, and shew better than words

can, how little hope there is of procuring any site for a Sanatarium on Teeur.

14. The whole of the hills are, in fact, of the same character; the only one which has any Table Land at all is that just disposed of, the rest have either a conical peak or a sharp spinal ridge, and the sides are everywhere precipitous to a degree: seen from a distance some of them may create the impression that there is Table Land at the top, but on visiting them the delusion is cleared away.

From Major F. D. ATKINSON, Deputy Secretary to the Government of India, Military Department, to the Quarter Master General of the Army,—(No. 641, dated Fort William, the 17th April 1861.)

WITH reference to your letter No. 102C, dated 22nd March 1861, I am directed to transmit to you the accompanying letter from the Secretary to the Government of Bengal, in the Public Works Department, No. 1249, dated 26th March 1861, together with the reports, with plans therewith received, on the localities amongst the Vindhya and other hills therein indicated, as regards their advantages, or otherwise, for the purposes of Sanataria, and to request that His Excellency the Commander-in-Chief may be moved to favor Government with his opinion thereon.

From Lieutenant Colonel C. B. YOUNG, Secretary to the Government of Bengal, in the Public Works Department, to the Secretary to the Government of India, Military Department,—(No. 1447, dated Fort William, the 6th April 1861.)

IT was stated in the 6th paragraph of my letter, No. 2712, dated the 9th July last, that measures were being adopted for testing the value of the Khas Mehal of Rhotas as a Sanatarium for European Troops; and in the 11th paragraph of the same letter it was added that the Medical authorities had been directed to take steps for ensuring a careful registration of the thermometric range and of the rain-fall at the European Cantonment of Dehree, distant about twenty-two miles from Rhotas.

2. A Native Sub-Assistant Surgeon, Gopal Chunder Patuck, was accordingly sent by the Principal Inspector General to Rhotasghur, for the purpose of taking a series of observations; and in January last, Dr. Forsyth forwarded a report of the results which had been obtained.

3. Copy of this report* and of its enclosures, comprising a Meteorological Register kept at Rhotas, from the 17th of August to the 7th of September last, and at Dehree during the months of July, August, and September 1860, are annexed, for the information of the Government of India.

* Letter No. 285, from Deputy Inspector General of Hospitals in the Benares Circle, to the Secretary to Principal Inspector General of the Medical Department, dated 29th December, and enclosures.

4. On the whole this report was not favorable; but as the Sub-Assistant Surgeon was a very short time on the hill, the Lieutenant-Governor felt that much information could not be derived from his statements. The papers were accordingly forwarded through the Commissioner of Patna to Mr. Davies, who has resided in the neighbourhood of Rhotas for a period of upwards of fourteen years, and he was asked to favor the Lieutenant-Governor with his views and the results of his experience on the su

5. From Mr. Davies' reply, copy of which† forms one of the enclosures of this letter, it would appear that Rhotas has long had the reputation, and not without cause, of being very unhealthy at certain seasons of the year.

† Dated 9th February last.

6. This account has since been confirmed by Dr. Hutchinson, Civil Assistant Surgeon of Arrah, who has furnished a very interesting report on the matter. Copy of this report‡, and of its transmitting letters from Doctors Balfour|| and Forsyth§, are also appended to complete what has been ascertained regarding this hill.

‡ Dated 18th February 1861, with a Map.

|| Memorandum No. 101.

§ No. 2022, of 4th ultimo, and enclosure.

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7. Having given due consideration to all that has been written, the Lieutenant-Governor is of opinion, that there is no reasonable hope of being able to establish a Sanatarium upon the Rhotas hill.

From A. GIBBON, Esq., Deputy Inspector General of Hospitals, Benares Circle, to N. CHEVERS, Esq., M. D., Secretary, Principal Inspector General, Medical Department,—(No. 285, dated the 29th December 1860.)

I HAVE the honor to acknowledge receipt of your letter, No. 999, dated 25th October last, and to forward to you, for submission to the Principal Inspector General, Medical Department, the accompanying Meteorological Tables kept at Rhotasgurh by Sub-Assistant Surgeon Gopaul Chunder Pattuck, from 17th to 31st of August, and 1st to 7th September 1860, together with his report on the Medical Topography of that place, dated 30th ultimo, and extract of a demi-offical letter from the Sub-Assistant Surgeon to my address, dated 1st September 1860, which gives some further description of Rhotasgurh.

I regret that illness prevented him from continuing his Meteorological observations for a longer period.

2. I also take this opportunity of transmitting to the Principal Inspector General, the Meteorological Registers kept at the station of Dehree by Surgeon Hastings, 63rd Regiment N. I., for July, August, and September 1860. Towards the end of the latter month, Doctor Hastings left Dehree with his Regiment, and the register of the thermometer was continued by Assistant Surgeon Gardner, attached to Her Majesty's 77th Regiment, who soon afterwards was ordered to the Presidency. Latterly, the Meteorological observations at Deheree have not been continued, there being no Medical Officer at that station.

The Sub-Assistant Surgeon kept his register in the usual form, noting the observations at sun rise, 10 A. M., 4 P. M., and 10 P. M.; but Surgeon Hastings did not register the temperature at all the corresponding hours. However, the minimum and maximum temperature at Deheree and at Rhotasgurh was registered at the same hours at both places, and may be compared as follows :—

From the 17th to 31st August 1860.

	At sun rise.	At 4 P. M.	Fall of rain during 15 days.
			Inches.
Mean Observations at Deheree	81° 6′	88° 5′	14·75
Mean ditto at Rhotasgurh	80° 2′	82° 8′	7·10

From 1st to 7th September 1860.

	At sun rise.	At 4 P. M.	Fall of rain during 7 days.
			Inches.
Mean Observations at Deheree	84° 2′	95°	....
Mean ditto at Rhotasgurh	83° 8′	86° 1′	....

Meteorological Register kept at the Station of

Latitude. 24°38′ — Longitude. 83°50′E.

Days of the Month.	At Sun Rise. Barometer.	At Sun Rise. Temperature. Of Mercury.	At Sun Rise. Temperature. Of the Air.	At Sun Rise. Temperature. Of Wet bulb.	At Sun Rise. Direction of the Wind.	At 10 A. M. Barometer.	At 10 A. M. Temperature. Of Mercury.	At 10 A. M. Temperature. Of the Air.	At 10 A. M. Temperature. Of Wet bulb.	At 10 A. M. Direction of the Wind.	At 4 P. M. Barometer.	At 4 P. M. Temperature. Of Mercury.	At 4 P. M. Temperature. Of the Air.	At 4 P. M. Temperature. Of Wet bulb.	At 4 P. M. Direction of the Wind.
	Inches.					Inches.					Inches.				
Augt. 17th	...	...	80	...	S.W	...	...	81½	..	S.W.	...	...	82	...	S. W.
18th	...	...	80	...	,,	...	...	81½	..	,,	...	...	82	...	S. W.
19th	...	...	80½	...	,,	...	...	81½	...	,,	...	...	82	...	S. W.
20th	...	...	80½	...	,,	...	...	81½	..	,,	...	...	83	...	S. W.
21st	...	...	80½	...	,,	...	...	81½	...	,,	...	...	81½	...	S. W.
22nd	...	...	79	...	,,	...	...	79½	...	,,	...	...	80	...	S. E.
23rd	...	...	78	...	,,	...	...	79½	...	,,	...	...	82½	...	S. W.
24th	...	...	79½	...	,,	...	...	80	...	,,	...	..	81	...	S. W.
25th	...	...	79½	...	,,	...	...	80	...	,,	...	...	81½	..	W.
26th	...	...	79½	...	W.	...	...	80½	..	W.	...	...	83	...	W.
27th	...	...	80	...	,,	...	...	81	...	,,	...	...	84	...	W.
28th	...	...	80	...	,,	...	...	82	...	,,	...	...	85½	...	W.
29th	...	...	82	...	,,	...	...	82½	...	,,	...	...	86	...	W.
30th	...	...	82	...	,,	...	...	84	...	,,	...	..	83½	..	W.
31st	...	...	83	..	,,	...	...	84	...	,,	...	...	84½	...	W.
Total ...	...	...	1,204	...	...	...	...	1,220½	...	...	...	...	1,242	...	...
Average ...	...	...	80·2	...	...	...	...	81·3	...	...	...	..	82·8	...	...

Rhotasgurh, for the Month of August 1860.
1*st September* 1860.

Height above Sea
1489 feet.

At 10 P. M. Barometer.	At 10 P. M. Temperature. Of Mercury.	At 10 P. M. Temperature. Of the Air.	At 10 P. M. Temperature. Of Wet bulb.	At 10 P. M. Direction of the Wind.	Thermometer in Sun's rays at 4 P. M.	Self-Registering Thermometer. Maximum.	Self-Registering Thermometer. Minimum.	Rain Gauge.	Days of the Month.	Remarks.
Ins.								Inches.		
...	...	80	...	S.W.	90	...	...	1·50	...	Rain for ½ hour at 1½ P. M., rest of the day clear, night often cloudy, cool.
...	...	81½	...	S.W.	Cloudy	...	...	2·40	...	Rain for ½ hour at 3½ P. M., day clear from morning to 2 P. M., rest of the day and night cloudy and cool.
...	...	82	...	S.W.	90	...	...	None	...	Day and night clear, night cool.
...	...	82½	...	S.W.	92½	...	...	"	...	Day and night clear, night cool.
...	...	80	...	S.W.	Cloudy	...	...	0·30	...	Day cloudy till 4 P. M. Wind very strong all day and night, little rain at 4. P. M., night cloudy and cool.
...	...	80	...	S. E.	Raining	...	...	2·20	...	Rain for all day and night very little. Day and night very cool. (I suppose he means that slight rain continued during the day and night. A. Gibbon.)
..	...	80½	...	S.W.	90	...	...	0·20	..	Day cloudy till 1 P. M., little rain at 2 P. M., rest of the day and all night clear, night very cool.
...	...	80	...	S.W.	88	...	...	None	...	Day and night often cloudy, night cool.
...	...	80	...	W.	90½	...	...	0·20	...	Day cloudy till 1 P. M., little rain at 2 P. M., rest of the day and night clear, night cool.
...	...	81½	...	W.	98	...	...	0·30	...	Day cloudy till 11 A. M., little rain at 12 A. M., rest of the day and night clear, night cool.
...	...	82½	...	W.	99½	...	...	None	...	Day and night clear, night cool.
...	...	82½	...	W.	101	...	...	"	...	Day and night clear, night cool.
...	...	83	..	W.	103½	...	...	"	...	Day very hot, night still cool.
...	...	84	...	W.	96½	...	...	"	...	Day very hot, till 3½ P. M., then cloudy at 4 P. M., again clear and hot, night the same.
...	...	84	...	W.	97½	...	...	"	...	Day and night very hot, often cloudy from 1 P. M.
...	...	1,224	...	...	1,137	Total	...	Inches of rain, 7·10		
...	...	81·6	...	...	94·7	...	...	...	...	

GOPAUL CHUNDER PATTUCK,

Sub-Assistant Surgeon, on special duty, Rhotasgurh.

Meteorological Register kept at the Station of

Latitude. 24° 38′ | Longitude. 83° 50′E.

Days of the Month.	At Sun Rise. Barometer.	At Sun Rise. Temperature. Of Mercury.	At Sun Rise. Temperature. Of the Air.	At Sun Rise. Temperature. Of Wet bulb.	At Sun Rise. Direction of the Wind.	At 10 A. M. Barometer.	At 10 A. M. Temperature. Of Mercury.	At 10 A. M. Temperature. Of the Air.	At 10 A. M. Temperature. Of Wet bulb.	At 10 A. M. Direction of the Wind.	At 4 P. M. Barometer.	At 4 P. M. Temperature. Of Mercury.	At 4 P. M. Temperature. Of the Air.	At 4 P. M. Temperature. Of Wet bulb.	At 4 P. M. Direction of the Wind.
	In.					In.					In.				
Sept. 1st	...	...	83	...	W.	...	...	85	...	W.	...	...	85½	...	W.
2nd	...	...	84	...	W.	...	...	84½	...	W.	...	...	84	...	W.
3rd	...	...	83½	...	S. E.	...	...	85	...	S. E.	...	...	86	...	S. E.
4th	...	...	84	...	S. E.	...	...	85	...	S. E.	...	...	85½	...	S. E.
5th	...	...	84	...	S. E.	...	...	85½	...	S. E.	...	...	87	...	S. W.
6th	...	...	84	...	S. E.	...	...	85½	...	S. E.	...	...	87½	...	S. W.
7th	...	...	84½	...	S. W.	...	...	86	...	S. W.	...	...	87½	...	S. W.
											Attacked with severe Inter				
Total ...	...	...	587	...	...	...	...	596½	...	...	...	...	603	...	...
Average.	...	...	83·8	..	...	...	...	85·1	...	...	...	...	86·1	...	...

Rhotasgurh, for the Month of September 1860.

1*st* 18

Height above the Sea

1489 feet.

At 10 P. M. Barometer.	Temperature. Of Mercury.	Of the Air.	Of Wet bulb.	Direction of the Wind.	Thermometer in Sun's rays at 4 P. M.	Self-Registering Thermometer. Maximum.	Minimum.	Rain Gauge.	Days of the Month.	Remarks.
Inches.								Inches.		
...	...	84½	...	W.	92	...	...	None	...	Day very hot, often cloudy, night the same, cool in the morning.
...	...	84	...	S. E.	92	...	...	None	...	Day very hot, often cloudy, night the same, cool in the morning.
...	..	85	...	S. E.	94½	...	...	None	...	Day and night hot, often cloudy, little cool in the morning
...	...	83½	...	S. E.	Cloudy	...	...	Very little at night	...	Day very cloudy, very little rain after 4 P. M., night very hot, little cool in the morning.
...	...	85	...	S. W.	104½	...	...	None	...	Day and night very hot, little cool in the morning.
...	...	86	...	N. W.	107	...	...	None	...	Day and night very hot, little cool in the morning.
...	...	86	...	S. W.	108	...	...	None	...	Same as yesterday.
mittent on the night of the 7th										
...	...	594	...	...	598	...	...	...	...	
...	...	84·8	...	...	99·8	..	...	...	...	

GOPAUL CHUNDER PATTUCK,

Sub-Asst. Surgeon, on special duty, Rhotasgurh.

From Baboo GOPAUL CHUNDER Pattuck, Sub-Assistant Surgeon, on special duty, Rhotasgurh, at present on sick leave at Shergotty, to A. GIBBON, Esq., Deputy Inspector General of Hospitals, Benares Circle,—(No. 41, dated the 30th November 1860.)

I HAVE the honor to acknowledge the receipt of your memorandum No. 235, dated the 21st instant, forwarding copy of a letter from the Secretary of the Principal Inspector General, Medical Department, No. 999, of the 25th ultimo, calling upon me to submit the Meteorological Tables kept by me while at Rhotasgurh, together with a report upon the Topography of that locality in its Medical aspect. I beg to state that my ill health did not permit me to make every scientific observations and enquiries I was deputed to make, save the very few which are as follows:—

2. I have already submitted the Meteorological Tables for the month of August; that for September is herewith annexed.

3. Rhotasgurh is properly the Fortress situated on the eastern end of a range of hills, called by the Natives Bindoo Giree, the portion named after the Fortress in north-east and south-west direction is about seven miles in length, and not more than two miles width; but its compass, including windings, is computed at about twenty-eight miles.

4. The undulated surface diversified with low hills, various water-courses, and several Table Lands, with a remarkably fine valley, constitute the main feature. A large portion of the plain is open, or rather meadows, used by the neighbouring villagers as pasture for their cattles, the remaining portions are jungles of variable density.

5. During the period of my observations the temperature of the air ranges in the average between 81° and 84°, which I believe will prove much lower in case of similar observations being taken on the plains below. As for the rain gauge, I am of opinion that no reliance can be had on the result obtained from the rains of this year,

since it has been the most scanty, as experienced by the Natives for several years back.

6. The direction of the wind was generally west and south-west, which has been experienced to be most healthy in this part of the country.

7. Fever of the intermittent type was very prevalent during my stay on the hills; even myself and all my attendants suffered from it, and are still suffering from the same, which compelled me to leave the place sooner than I ought to have otherwise done, only for want of any Medical assistance. From information collected on the spot, (although my experience cannot add a word), I was led to know that cholera is not very unfrequent during the hotweather, (as there were some cases occurred during the stay of the Loodhiana Regiment at that station) I must attribute the cause, first, to the malaria that arises from the swamps, and from the accumulation of stagnant water in which vegetation and the falling of vegetable substances from surrounding places, and much to putrefaction; and secondly, to the want of free ventilation by the jungles, not only of shrubs and thickets, but trees of larger dimensions, such as mangoes, and mowahs, and tamarinds, &c., &c.

8. It is however difficult to define with any precision, how the place and its climate can be made healthy and salubrious by proper drainage, so as to prevent the collection of stagnant water; and by clearing the jungles to secure free ventilation. I cannot also draw any conclusion as to how the locality can suit European constitution (most probably suit very well), since any information on the subject amounts to nothing.

9. As far as I have observed, I can safely state that the tract of land situated along the river side, east of the Palace, called Shirk Mehal, and southward of the place called Suksukwa Ghat, may be chosen as suitable for buildings, if Government intend to build any; but the only objection is the existence of a swamp which, from its position particularly towards west, can even contaminate the salubrious westerly winds.

10. The best tract of land to which I can give the preference with more safety is on both sides of the very remarkably defined valley, further south-west of the place called Raj Ghat: it is in my opinion a healthy plain and unobjectionable in every point.

11. One great difficulty to be met with, and can be overcome, is the want of good fresh and wholesome water. There does not exist any natural fountain; those that are seen during rains and some months afterwards cannot be properly called springs of water, but rather water-courses to carry down the water that accumulates during rains. It is however probable that good supply of water can be obtained by artificial means by digging out wells and ponds in places where some springs below the surface may be observed, and thereby the wells may be kept always full.

Extract from a demi-official letter from Sub-Assistant Sergeon GOPAUL CHUNDER PATTUCK, *to Doctor A.* GIBBON, *Deputy Inspector General of Hospitals at Benares, dated Rhotasgurh, 1st September* 1860.

RHOTASGURH is twenty-four miles from Deheree—the top of the hill can be seen from there—it is about six miles high from the plains, and about 1489 feet above the level of the sea. It is a very beautiful place, but covered with jungles and large trees in most places, and some parts are quite clear. The Fort itself is very beautiful and very strong, about twenty-eight miles in circumference, surrounded with stone walls, especially where the Ghauts are. Within is another Fort of about twelve miles in circumference—the entrance gates are very splendid—within the inner Fort is the old Palace, a magnificent building, in which I am residing, all made of stone without any wood-work; and although about 400 years old, still it is in a very good condition, but surrounded and covered with jungles and large trees. I took about four hours to reach the Palace. The road by Akberpore is very high and tiresome, but by Rajghat it is very good; horses, palkies, and elephants can come by this road. Beyond the Palace, and further off are some villages inhabited by *Dhagurs*, who are very ugly people—the soil is very fruitful—the open places near the side of the river are ex-

ceedingly good and healthy—the prevailing winds are south-west and west, which are very healthy. As there has been very little rain this year and jungles all about, therefore the climate is getting rather unhealthy—the temperature rising every day, because no rain for last five or six days; but it is rather cool in the night and morning. On my arrival here it was so cool, especially in the night, that I was obliged to use warm clothes—it is now becoming hotter every day, and I was informed that the villagers are suffering from intermittent fever—two of my servants also. If the small jungles are to be cut away, I have no doubt that it is a good and healthy place—no wild animals here, but a good number of monkeys all about.

Meteorological Register kept at the Quarters of the Surgeon of the 63rd Regiment

Latitude 25° *Longitude* 84° *East.*

Days of the month.	At 6 A. M. Barometer.	At 6 A. M. Temperature. Of Mercury.	At 6 A. M. Temperature. Of the Air.	At 6 A. M. Temperature. Of Wet bulb.	At 6 A. M. Direction of the Wind.	At 2 P. M. Barometer.	At 2 P. M. Temperature. Of Mercury.	At 2 P. M. Temperature. Of the Air.	At 2 P. M. Temperature. Of Wet bulb.	At 2 P. M. Direction of the Wind.	At 4 P. M. Barometer.	At 4 P. M. Temperature. Of Mercury.	At 4 P. M. Temperature. Of the Air.	At 4 P. M. Temperature. Of Wet bulb.	At 4 P. M. Direction of the Wind.
	Ins.					Ins.					Ins.				
1st Sept.	—	—	85	—	S.	—	—	93	—	N. E.	—	—	91	—	E.
2nd „	—	—	84	—	E.	—	—	96½	—	E.	—	—	89	—	„
3rd „	—	—	82	—	„	—	—	95	—	„	—	—	99	—	„
4th „	—	—	85	—	„	—	—	95	—	„	—	—	95	—	„
5th „	—	—	84½	—	„	—	—	97	—	„	—	—	94	—	„
6th „	—	—	84	—	„	—	—	95	—	„	—	—	98	—	„
7th „	—	—	85	—	„	—	—	94	—	„	—	—	99	—	„
8th „	—	—	85½	—	„	—	—	83	—	N. E.	—	—	83	—	N. E.
9th „	—	—	82	—	S.	—	—	90	—	S.	—	—	86	—	S. E.
10th „	—	—	79	—	W.	—	—	87	—	W.	—	—	82	—	E.
11th „	—	—	81	—	E.	—	—	91	—	E.	—	—	90½	—	„
12th „	—	—	82	—	S. W.	—	—	91	—	S. E.	—	—	90	—	„
13th „	—	—	83	—	S.	—	—	92½	—	„	—	—	93	—	S. E.
14th „	—	—	83½	—	S. E.	—	—	92	—	„	—	—	91	—	„
15th „	—	—	84	—	„	—	—	93½	—	„	—	—	89	—	S. W.
16th „	—	—	83	—	S.	—	—	92	—	„	—	—	90½	—	N. E.
17th „	—	—	83	—	E.	—	—	93	—	N. E.	—	—	91	—	W.
18th „	—	—	81	—	N. E.	—	—	92	—	„	—	—	92	—	N. E.
19th „	—	—	82	—	E.	—	—	88	—	E.	—	—	88½	—	E.
20th „	—	—	79½	—	„	—	—	88	—	„	—	—	89	—	„
21st „	—	—	78	—	S.	—	—	93	—	S. W.	—	—	95	—	W.
22nd „	—	—	81	—	„	—	—	93	—	W.	—	—	95	—	„
23rd „	—	—	82	—	„	—	—	88	—	„	—	—	89½	—	N. W.
24th „	—	—	83	—	E.	—	—	90	—	N.	—	—	90	—	N.
25th „	—	—	84	—	S.	—	—	90½	—	S.	—	—	92	—	E.
26th „	—	—	85½	—	„	—	—	92½	—	E.	—	—	92½	—	„
27th „	—	—	84	—	E.	—	—	92	—	N. E.	—	—	91	—	„
28th „	—	—	84	—	„	—	—	90	—	E.	—	—	91	—	„
29th „	—	—	84	—	„	—	—	90	—	„	—	—	91	—	„
30th „	—	—	85	—	„	—	—	89	—	„	—	—	90	—	„
Total ...	—	—	2488	—	—	—	—	2746	—	—	—	—	2737½	—	...
Mean ...	—	—	82·6	—	—	—	—	91·5	—	—	—	—	91·2	—	...

At 6 *A. M.*
Total from 1st to 7th September=589½
Mean from „ to „ =84·2

At 4 *P. M.*
Total from 1st to 7th September=665
Mean from „ to „ =95

A. GIBBON,
Depy. Inspr. Genl. of Hospitals.

Native Infantry, at the Station of Deheree, for the month of September 1860.

The 1*st October* 1860.

Height above the Sea.

At 10 P. M.					Thermometer in Sun's rays at 4 P. M.	Self-Registering Thermometer.			Days of the Month.
	Temperature.								
Barometer.	Of Mercury.	Of the Air.	Of Wet bulb.	Direction of the Wind.		Maximum.	Minimum.	Rain Gauge.	
Inches.								Inches.	
—	—	88	—	E.	—	—	—	—	
—	—	85½	—	"	—	—	—	—	Rain near hills.
—	—	89	—	"	—	—	—	—	Clear and hot.
—	—	89	—	"	—	—	—	—	Ditto.
—	—	90	—	"	—	—	—	—	Ditto.
—	—	91	—	"	—	—	—	—	Ditto.
—	—	91½	—	"	—	—	—	—	Ditto.
—	—	83	—	S. E.	—	—	—	2·50	Rain.
—	—	82	—	S.	—	—	—	2·05	Ditto.
—	—	82	—	E.	—	—	—	3·0	
—	—	85	—	"	—	—	—	0·20	
—	—	87	—	...	—	—	—	—	
—	—	89	—	S. E.	—	—	—	—	
—	—	88	—	...	—	—	—	—	
—	—	84½	—	E.	—	—	—	1·50	
—	—	87	—	"	—	—	—	—	
—	—	85	—	N. E.	—	—	—	—	
—	—	85	—	E.	—	—	—	—	
—	—	84	—	"	—	—	—	—	
—	—	83	—	"	—	—	—	—	
—	—	84	—	S. W.	—	—	—	—	
—	—	87	—	W.	—	—	—	—	
—	—	85	—	N.	—	—	—	—	Slight shower.
—	—	87	—	...	—	—	—	—	
—	—	88½	—	N. E.	—	—	—	—	
—	—	89	—	"	—	—	—	—	
—	—	89	—	E.	—	—	—	—	
—	—	88	—	E.	—	—	—	—	Ditto.
—	—	87	—	E.	—	—	—	—	
—	—	81	—	N. W.*	* Cloudy with appearance of heavy rains.				
...	...	2594	—	...	...	Total Rain..		7·25	
...	...	86·4	—	...	...	...	...	...	

T. J. GARDNER, *Asst. Surgn.*,

In Medl. charge, Deheree.

Meteorological Register kept at the Cantonment of Deheree for the month of August 1860.

Deheree, 1st *September* 1860.

Latitude 25°. *Longitude* 84° *East.*

Note.—The Thermometer was kept at the Quarters of Surgeon Hastings, in a Verandah with North-Western aspect.

Date.	At Sun Rise.		At 2 p. m.		At 4 p. m.		At 8 p. m.		Rain Gauge.	Remarks.
	Temperature.	Direction of Wind.	Temperature.	Direction of Wind.	Temperature.	Direction of Wind.	Temperature.	Direction of Wind.	Ins.	
1st Augt.	82½	S. E.	86½	East	96	East	85	East	0·70	Morning close. A shower of rain at 2 p. m.
2nd „	83	E. S. E.	95	S. E.	96	E.	89	E.	...	Day clear and hot.
3rd „	84	E.	94	E.	95½	E.	83	E.	3·50	Heavy rain with high wind in the evening.
4th „	81	E.	93	E.	94	E.	84	E.	...	Some rain in the vicinity in the evening. Day clear.
5th „	83½	E.	90	E.	92	E.	85	E.	0·40	Rain in the evening.
6th „	82	E.	94	S. E.	95	E.	87	E.	...	Rain in the neighbourhood, but none at Deheree.
7th „	81½	E.	92	E.	84	E. S. E.	84	E.	0·60	Rain in afternoon, wind high, all day cloudy.
8th „	80	E.	90	E. S. E.	92	E. S. E.	83	E.S.E.	3·0	Wind high, rain fell several times during the day.
9th „	83	E. S. E.	92	S. E.	95	S. E.	88	S.	...	Day bright.
10th „	83	S. E.	87	S. W.	91	S. W.	...	...	2·0	Several showers during the day.
11th „	84	S.	92	W.	90	W.	87	W.	...	Day cloudy and close.
12th „	84	W.	87	W.	89	W.	86	W.	0·20	Day cloudy.

13th Augt.	79	W.	91	S. E.	86	S. E.	...	...	0·50	Day cloudy.
14th „	82	E.	92	E.	82	E.	86	E.	...	Ditto. Ditto.
15th „	83	E.	90	E.	85	E.	83	E.	0·10	Cloudy. Rain in vicinity several times during the day.
									0·10	Ditto ditto.
16th „	82	S.	87	S.	86	S. W.	83	S.	6·80	Heavy rain during the night.
17th „	79	S.	84	S.	82	S.	83	S.	0·50	Cloudy. Several showers during the day.
18th „	82	E.	86	E.	83	E. S. E.	82½	S. E.		
19th „	81	S.	88	S.	91	S.	86½	S.	...	Cloudy and close.
20th „	82	S. W.	90½	S. W.	88	S. W.	86	S. W.	0·25	Ditto showery.
21st „	83	S. W.	83	S. W.	82	S. W.	80	S. W.	0·30	Ditto ditto with high wind.
22nd „	79	S. W.	78	S. W.	78½	S. W.	79	S. W.	4·50	Rained greater part of the day.
23rd „	79	S.	88	S. W.	87½	S. W.	84	S. W.	2· 0	Rained during the night.
24th „	81	S.	86	S. W.	88	S. W.	84	S. E.	0·20	Cloudy all day.
25th „	82	S.	84	S. W.	88¼	S. W.	85	S.	0·20	Day cloudy, evening close and hot.
26th „	82	S. W.	92	W.	93	W.	85	S.	...	Day hot, evening clear and cool.
27th „	82	S.	93	S.	91	S. W.	86	S. W.	...	Wind high.
28th „	82	S. W.	93	S. W.	95	S. W.	88	S.	...	Ditto in early part of the day. Evening and night hot.
29th „	83	S.	91	S. W.	92	W.	89	S.	...	A slight shower, but not sufficient to affect the Instrument.
30th „	83	S.	94	W.	95	S. W.	89	S. W.	...	Day hot.
31st „	84	S.	93	S.	94	S.	90	S.	...	Day very hot and oppressive.
Total ...	2541		2776		2786		2470		25·85	
Mean ...	82		89		90		85			

	At Sun rise.		*At 4 P. M.*
Total from 17th to 31st August	... 1224	Total from 17th to 31st August	... 1328
Mean „ „ to „ „	... 81·6	Mean „ „ to „ „	... 88·5

A. GIBBON,

Depy. Inspr. Genl. of Hospitals.

T. HASTINGS, *Surgeon,*

In Medl. charge, 63rd Regt. N. I.

Meteorological Register kept at the Cantonment of Deheree for the Month of July 1860.

Latitude 25° *Longitude* 84° *East.* DEHEREE, 1*st* *August* 1860.

NOTE.—The Thermometer was kept at the Quarters of Surgeon Hastings, in a Verandah with North-Western aspect.

Date.	At Sun Rise.		At 2 P. M.		At 4 P. M.		At 8 P. M.		Rain Gauge.	Remarks.
	Temperature.	Direction of Wind.	Temperature.	Direction of Wind.	Temperature.	Direction of Wind.	Temperature.	Direction of Wind.	Inches.	
1st July...	84	S. E.	98	S. E.	91½	S. W.	89	S. W.	...	Had no Rain Gauge: Rain slight about 4 P. M.
2nd „ ...	85	E.	99½	E.	106	E. S. E.	90	E. S. E.	...	Had no Rain Gauge: Day cloudy, close and hot. Rain in night.
3rd „ ...	85	S.	97	E.	94	E. S. E.	90	E.	...	Had no Rain Gauge: Day very close and hot. Heavy rain during the night.
4th „ ...	86½	E.	89	E.	88	E.	87	E.	...	Had no Rain Gauge: Day cool, rain fell on all sides at some distance, but none at Deheree.
5th „ ...	85	E.	93	E.	93½	S. E.	83	E.	0·25	Rain fell after 4 P. M., and temperature decreased at once 12½.
6th „ ...	83	E. S. E.	93	E.	90½	E.	86	E.	...	Day cloudy and hot, and in the evening very close.
7th „ ...	84½	S.	86½	S. E.	86	S. E.	80	S. W.	0·25	Rain fell between 2 and 3 P. M., and again in the evening, night cool.
8th „ ...	82	S. W.	92	S. W.	93½	S. W.	89	S. W.	...	Cloudy.

9th „ ...	86	S. W.	99	S. W.	100	S. W.	88	S. W.	...	Wind almost hot and high.
10th „ ...	87	S. W.	100	S. W.	100	S. W.	93	S. W.	...	Ditto ditto no sign of rain.
11th „ ...	91½	S. W.	100	S. W.	101	S. W.	95	S. W.	...	Wind warm and high.
12th „ ...	90	S. W.	101	S. W.	101	S. W.	95	S. W.	...	Ditto ditto.
13th „ ...	91	E.	104½	W.	106	W.	97	S. E.	...	Day very oppressive.
14th „ ...	89	S.	99	S.	97	S.	83	S. E.	...	
15th „ ...	87½	S. E.	92	N. W.	101	E.	...	...	...	A few drops of rain, but not sufficient to affect the gauge.
16th „ ...	87	S. E.	94	S. E.	82	E.	84	E.	0·50	Rain fell in abundance in the neighbourhood of the hills.
17th „ ...	82	S. E.	89½	S. E.	80	E.	83	S. E.	6·10	Rain during the night, heavy rain in the afternoon.
18th „ ...	81	E.	92	E.	89½	E.	85	E.	...	Day cloudy, and rain in vicinity of the hills.
19th „ ...	81	E.	96½	E.	97	E.	87	E.	...	
20th „ ...	84	E.	97	E.	98	E.	87	E.	...	
21st „ ...	79	W.	81	N. W.	81	N. W.	81	E.	1·60	Rain in afternoon, cloudy from early morning.
22nd „ ...	81	E.	84	E.	90	E.	82½	E.	0·50	Ditto ditto.
23rd „ ...	82	E.	82½	E.	88	E.	82	E.	7·0	
24th „ ...	81	S.	87½	S.	86½	S. W.	82½	S. W.	5·35	Heavy rain in evening, cloudy all day.
25th „ ...	81	S. W.	83½	S. W.	81	S. W.	82	S. W.	11·25	Very heavy rain during night and day.
26th „ ...	80	S. W.	83	S. W.	82½	S. W.	81	S. W.	6·0	Heavy rain in morning.
27th „ ...	80	S. W.	85	S. W.	87	S. W.	...	...	...	Cloudy all day, a few drops of rain only.
28th „ ...	80½	S. W.	92	S.	87½	S. E.	83	E.	...	A few drops of rain.
29th „ ...	81	E.	92	S. E.	96	S. E.	84	E.	...	Cloudy in the morning.
30th „ ...	81	E.	89	E.	88	E.	85½	E.	...	Wind rather high, cloudy.
31st „ ...	81	E.	92½	E.	96	E.	87½	E.	...	Day bright, wind high.
Total ...	2599½		2864½		2859		2512		38·80	
Mean ...	84		92		92		86			

T. HASTINGS, *Surgeon,*

In Medical charge, 63rd Regiment, Native Infantry.

From C. E. Davies, Esq., to H. D. H. Fergusson, Esq., Commissioner of Patna,— (dated the 9th February 1861.)

I have the honor to acknowledge the receipt of your letter dated the 31st January 1861, Camp Hutwah, together with copy of a letter No. 321, dated the 21st January 1861, from the Secretary, Department of Public Works, to the Government of Bengal, to your address, along with other papers relating to Sub-Assistant Surgeon, Gopal Chunder Pattuck's appointment for the purpose of making meteorologic and other observations on Rhotas.

2. With reference to paragraph 3 of Lieutenant-Colonel C. B. Young's letter of the 21st ultimo, I would beg to observe that I furnished the Sub-Assistant Surgeon with information on various points, both before he went up to join his post on the 17th of August 1860, and after he came down thence, and rendered to him all the assistance of which he stood in need.

3. Fevers of intermittent, as also at times of remittent type, prevail on Rhotas generally, from the commencement of August to the end of September, and occasionally even to the middle of November. Natives of the plains who go up to the Table Land during those months, seldom escape the fever, and the inhabitants of the Table Land themselves are also subject thereto, though not to so great a degree as the low-landers. The Sub-Assistant Surgeon, though forewarned and living in a dry, elevated, and well sheltered place of abode, and having due recourse to precautionary measures, suggested by his experience, was unable to save either himself or servants from attacks of the disorder. The swamps and accumulations of stagnant* water to which the Sub-Assistant Surgeon alludes, are the ponds on which the water supply of Rhotas entirely depends. They are situate in three places along the cultured, and in two about the uncultured tracts, and occupy an extremely limited area. The water contained in them is clear, stocked with fish, and shaded over by *nelumbium speciosum,* and becomes putrescent only in one or two places in the hot weather alone, when Rhotas is quite healthy. The notion concerning the absence of free ventilation on Rhotas exists, I am afraid, purely in imagination: far *more than one-half* of the surface is quite open, whilst of jungle, strictly so called, there is none. An open growth of medium sized indigenous timber with scanty foliage, distant from places of

* Primarily signifying nothing more than 'still,' 'standing'; of late the word has acquired a dyslogistic import.

habitation, and rising out of a thin under-wood easily permeable in every direction, and sparsely scattered bassias with mangoes form the wood. Tamarind trees on the whole are infrequent, and the bamboo almost entirely absent. The reasons usually adduced to account for the periodic unhealthiness of this Table Land are seen to be inadequate when we extend our observations generally to the surface of the Kymore in Shahabad. Those living above, on open plains of some extent, with scarcely any wood thereon, and no collections of water, are as much subject to fevers as people abiding in woody tracts; and in some places villages on very lofty sites composed of hard soil and rock are fearfully unhealthy. The inhabited spots on Rhotas itself are clear and open. The periodic insalubrity of this whole Table Land would appear to originate in the conformation of the surface, along with the vegetable mould covering the subjacent rock. The sides of the Table Land almost everywhere are elevated and slope inward, forming a series of extensive shallow basins, towards which there is a protracted sub-drainage from the saturated, spongy, circumjacent mould; the water continuing to escape therefrom beneath the rocks gradually along the few natural channels of exit till the month of October, or at times till mid November, should the rains have been late. Cholera is very infrequent on Rhotas, chiefly because no thoroughfares lead over it from the plains. The account of part of the Loodianah Regiment having suffered there, from that disease, is erroneous.

4. The tract of land alluded to in paragraph 9 of the Sub-Assistant Surgeon's letter, is certainly, so far as tolerable evenness is concerned, fit for building, and is for the most part quite out of the influence of even the 'salubrious westerly wind contaminating swamp'; but it is a waterless neighbourhood. The situation referred to in paragraph 10 is undoubtedly superior, though in common with all sites on the Table Land, subject to those general conditions, which render periodic insalubrity the rule, and not the exception.

5. Natural springs are rare, scanty, and never perennial, consequently water has always to be stored in the rains. During one hot season I was unable to visit the palace for even a day, owing to the entire failure of the wells from the drying up of the ponds. It is a mistake to regard the water of Rhotas as generally unwholesome. Standing in large receptacles of rock with bottoms covered with dark

clay and percolating strata of pure sandstone, the water, though not superabundant, is peculiarly sweet and good, excepting towards the end of August, in September, and through part of October, when, though fresh, it is colored with a greenish vegetable matter.

6. The remarks made in the 'extract' that, "as there has been very little rain this year—jungles [are] all about—therefore the climate is getting rather unhealthy," is wide of the mark, for correctly speaking, the season was not nearly so unhealthy as it usually is, because of the scantiness of the rains.

7. During the hot weather the maximum temperature above is 104°, freely exposed to the air in a shaded place, whilst on the plains a thermometer similarly placed rises to 120°. Elevation alone, of course, will in no way account for this difference. To counterbalance the advantage of a temperature by day, so much lower than that of the plains, is the fact of the great warmth of the nights which throughout the hot weather are seldom cool, unless an east wind prevail. A temperature of from 90° to 94° being very usual, and even 98° not uncommon; but the warmth being attended by a singular condition of air which renders sleeping almost impossible. On the plains, however, the temperature after midnight sinks to 84° or even lower. In sunny days during the rains Rhotas is four degrees cooler than the plains, whilst on rainy days I have seen the thermometer at 72° above, when it was at 80° below. In the cold season it is from four to five degrees warmer at top than it is below. I passed the greater part of the hot weather of 1855 in the palace, coming down occasionally to the plains. Since that period experience has taught me to avoid the extreme discomfort of hot nights above. During the rains I am in the habit of frequenting the place to the end of July. If occasion should require my presence afterwards, I never go up for more than a day or two at most, till November; having had a very severe attack of fever from an abode of four or five days above, in October 1856. Any extensive clearance of such wood as exists on Rhotas would, without altering materially the insalubrity of the place, add not a little to the temperature of both day and night in the hot weather.

8. Many of the particulars stated above, I brought to the notice of the Deputy Inspector General, Dr. McClelland, when he was here,

about the 18th or 19th ultimo, and I have no doubt of his having got notes of some of them.

9. In conclusion, permit me to remark that besides the peculiar conformation of the surface of the Kymore in Shahabad (the slopes inclining inward from the sides towards more or less extensive shallow depressions), is the fact that the Table Land of those parts generally lies much below the limit of elevation, at which agues and posthyctal fevers ordinarily cease to prevail, and therefore these tracts cannot fail to be insalubrious periodically.

P. S.—All the enclosures accompanying your letter of the 31st ultimo, are herewith forwarded under a separate cover to your address by this day's post.

REPORT.

Having recently spent a few days on the summit of the Rhotas hill, I beg to offer the following remarks on the advisability of locating there a Sanatarium.

The general features of the hill have been oft described, and accurate surveys doubtless exist; but to save the trouble of reference, I will describe them briefly and illustrate them by a map.

The hill presents the usual Table-top appearance of most of the hills in the same range, and it projects its rugged headland eastward, far into the valley of the Soane, forming the southern boundary of a vast and picturesque gorge in the hills, which opens eastward on to the Soane, and is watered by the pretty little Ousaneh river.

I should say that the average height of the hill was 1,450 feet above the level of the sea, but high lands exist on the summit which are 1,480 and 1,500 feet above the same level.

The geological structure is simple, and clearly exhibited: the summit consists of a vast bed of sandstone, which rests on a similar bed of limestone, that again on alum shale: on the sandstone rests a superstratum of soil, varying in thickness, I should say, from 1, 6 to 10 feet.

The summit consists of Table Land intersected by a sandstone ridge which runs across from the south-west to the north-east. The extreme length of the Table Land is about six miles from west to

east, and its breadth about five miles from north to south. The ridge is the water shed of the hill, and consequently the drainage is to the north and south.

The summit is richly clothed with the foliage of large trees, such as the mango and mowa. The bael grows wild in profusion, and there are a few fan palms scattered about.

In some places the brushwood is pretty thick.

The portion of the summit to the south of the ridge is like a great amphitheatre, at the bottom of which stands the palace. The whole hill is fortified, and the fortifications are said to have a sweep of twenty-eight miles, enclosing the mosques, temples, tanks, tombs, and palaces of Rhotas.

The height of the hill must affect its temperature, and so it does, for I was told that in the hot weather there is a difference of 14 degrees Fahrenheit between the summit and the valley below.

The climate is said to be unhealthy, but only towards the close of the rains, when fevers of the intermittent and remittent types are prevalent. I do not see why, under the circumstances I have described, it should not be so. As the then stratum of soil rests upon sandstone, there can be but slow drainage downwards, and consequently when once saturated, it must remain for sometime like a sponge, exhaling a large amount of miasm.

Apart from this, what place in this country, once inhabited and then reclaimed by jungle, is healthy, and that too at the close of the rains?

Again, the only parts of the fortress, whose healthiness has, I believe, been tested, are the palace and the two villages or hamlets: all three lie in the deep hollow; and besides, the palace and eastern village must be influenced by the emanations from the enormous accumulation of decayed vegetation in the large tanks quite close to both.

The palace is supplied with water from a well which is filled by percolation from the tank, which again owes all its waters to the rain.

In seasons of drought all the tanks dry up, and with them the well; but if the former were cleared of the mud and accumulated vegetable matter, they would hold an unfailing supply of water.

The water of the well is the most delicious I have ever tasted, and it showed no cloud with nitrate of silver, the only test I had with me.

After what I have written, it will be evident that the palace and its neighbourhood would be wholly unsuited for a Sanatarium; in fact it would be foolish to place one there. But there are other portions of the hill which present none of the above disadvantages, and especially the eastern portion which, I think, presents an admirable locality for a Sanatarium. It is high (about 1,180 feet), freely exposed to the air, and very slightly encumbered with trees or brushwood, owing to the scantiness of the soil.

A very large and ancient bund, passed in crossing over to the high ground, would, if attended to, command a large supply of water, and failing that, the Ousaneh stream would be more accessible than the Dhobies' Ghaut at Landour.

A reference to the map will show how close this end is to Akberpore, situated on the high road, and twenty-eight miles distant from the Grand Trunk Road at Deheree. Again, the Suk-Sukwa Ghaut leading up from Akberpore is the shortest and easiest ascent.

Such a Sanatarium would be invaluable to Benares, Deheree, and Dinapore, being comparatively close and quite easily accessible to all three stations.

But before thinking of placing a Sanatarium there, it would be necessary, for a year at least, to conduct a careful series of meteorological observations, and to institute a minute enquiry into the alleged unhealthiness of the locality, and its supposed cause.

I am prepared to undertake both; and perhaps, as Medical Officer of the district, should have peculiar facilities in so doing.

(Signed.) R. F. HUTCHINSON, M. D.,
Civil Assistant Surgeon, Shahabad.

ARRAH,
The 18th February 1861.

Memorandum from Dr. JOHN BALFOUR, Officiating Deputy Inspector General of Hospitals,—(No. 101, dated the 22nd February 1861.)

FORWARDS for the information of the Principal Inspector General, Medical Department, the above report on Rhotas, as suggested, for a Sanatarium, from the statement of Doctor Cootees, now at Chumparun,

who was some time stationed there. There is reason to believe that the site of the old palace would prove unhealthy. It is possible, however, that Dr. Hutchinson's suggestion of occupying another portion of the locality would obviate the difficulty as to health, in which case an establishment would be of much service to the neighbouring stations. A Sub-Assistant Surgeon was, I believe, stationed at Rhotas for some time with the view of making a meteorological and other reports, but the result is not known in this office.

From Dr. J. FORSYTH, Principal Inspector General, Medical Department, to Lieutenant-Colonel C. B. YOUNG, Secretary to the Government of Bengal, Public Works Department,—(No. 2022, dated the 4th March 1861.)

WITH reference to the 1st paragraph of this office letter, No. 1355, dated 3rd January last, I have the honor respectfully to submit, for the consideration and orders of His Honor the Lieutenant-Governor of Bengal, the accompanying report dated 18th ultimo, from Civil Assistant Surgeon R. F. Hutchinson, M. D., of Arrah, on the capability of Rhotas as a Sanatarium, and beg to suggest that there appears to exist considerable difficulty in obtaining a proper water supply.

2. I beg leave to observe, that I apprehend that the evil reputation which the place has obtained during the hot weather and rains, and the fact that the summit is hotter at night than the surrounding plain country, as reported by the Officiating Inspector General of Hospitals of the Lower Provinces, in his Diary of Inspection, for the month of January last, an extract of which is hereto appended, will make it very undesirable as a Sanatarium.

Extract from the Diary of Inspection of the Officiating Inspector General of Hospitals, Lower Provinces,—(dated the 2nd February 1861.)

Rhotasgurh.—On the 18th I visited Rhotasgurh, twenty-two miles south-west of Deheree, and 890 feet above the plains. The ascent is impracticable for cattle, but if necessary, it could easily be improved. Mr. C. E. Davies, who resides at the foot of Rhotasgurh, describes the hill as intolerably hot at night, so much so that he never visits it in the hot season.

After the rains set in, the climate of the hill is delightful, Mr. Davies observes, for two months; when about the end of August until the month of November fevers prevail, so that none escape them. Mr. Davies's opinion is based on an experience of fourteen years.

This is attributable to the peculiar structure of Rhotasgurh itself, which is a Table Land, hollow in the centre, to which there is a slope on all sides.

The ravine by which the natural drainage was effected, has been for ages artificially closed up, converting a third part of the hill into a marsh, and yet without this, water essential for its occupation would not be procurable.

With regard to temperature, we have observations kept at Rhotasgurh from the 17th to the 31st August, and from the 1st to the 7th of September, by Sub-Assistant Surgeon, Gopal Chunder Pattuck. Comparing these with observations made at corresponding hours and dates at Deheree Ghaut by Surgeon Hastings and Assistant Surgeon Gardner, we find that although Rhotasgurh is 6° Fahrenheit, cooler at 4 P. M. than Deheree Ghaut, during the last fifteen days of the month of August, yet that Rhotasgurh is 1° 5′ Fahrenheit hotter than Deheree at sunrise.

Thus confirming the statement of Mr. Davies that Rhotas, although cooler in the day, is hotter at night than the plains.

From Major F. D. ATKINSON, Deputy Secretary to the Government of India, Military Department, to the Quarter Master General of the Army,—(No. 930, dated Fort William, the 23rd April 1861.)

I am directed to transmit to you, for the information of His Excellency the Commander-in-Chief, the accompanying copy of a letter with annexments, from the Secretary to the Government of Bengal, in the Public Works Department, No. 1447, dated 6th April 1861, stating that the Hon'ble the Lieutenant-Governor is of opinion that there is no reasonable hope of being able to establish a Sanatarium on the Rhotas hill.

From Colonel A. BECHER, C. B., Quarter Master General of the Army, to the Secretary to the Government of India, Military Department,—(No. 102C, dated Head Quarters, Calcutta, the 22nd March 1861.)

HAVING laid before the Commander-in-Chief your letter No. 16, dated 1st February, with its annexed report by Dr. Balfour, on Mahooagurree hill, in the neighbourhood of Rajmehal, I am desired to request, you will convey to Government the thanks of His Excellency for the opportunity which was thus afforded of providing a place of healthful change and recreation to convalescent Soldiers in Bengal. On perusal of Dr. Balfour's report, Sir Hugh Rose was strongly impressed with

the advantages of the hill in question, held out to that extent, and was about to order the further enquiry suggested in your letter, when he had the opportunity of perusing a more detailed report on the site in question, furnished in a letter from Mr. Oldham, the Superintendent of the geological survey of India, to the Chief Engineer of Bengal, of which an extract is hereto appended; and as the Commander-in-Chief feels sure the practical experience of this eminently qualified officer may in all its facts be relied on, as furnishing undeniable proofs of the insalubrity of "Mowagharria," Sir Hugh Rose does not now think it desirable to make any further enquiries or experiments on the subject.

2. The Commander-in-Chief, however, desires to thank Dr. Balfour for the zeal which prompted him to examine and report on the hill in question.

Extract of a letter dated 14th March 1861, *from Mr.* T. OLDHAM, *Superintendent of the Geological Survey of India, to Colonel* YOUNG, *Chief Engineer, Bengal.*

"Mowagharria hill is, at first sight, *remarkably* well suited for such a purpose; it is a flat-topped hill, covered chiefly with good soil—easily cultivable in many places—offers abundant room for buildings—plenty of water in places—could be made easily accessible—pretty scenery, &c., &c.; and on my first visit to that place so long since as 1853, I was, I confess, much struck with these facts, and wondered why advantage had not been taken of such a place—and this would, I believe, be the impression of most persons. A little further experience of those hills, however, and of the climate of India generally, has entirely changed my view.

Mowagharria is about 1,900 feet above level of sea. It stands on the west side of the hills immediately over the comparatively flat and elevated country of the pergunnah of Hendwah and Belputtah in Bhagulpore, and of Deoghur in Beerbhoom districts; all more or less covered with jungle in parts of considerable extent. It is thus exposed to the full force of the hot west winds, which I can state from experience, blow fiercely on the top of the hill. These hot winds also come charged with all the malaria of the jungles below, and sweep up the sides of the hill with unabated violence. The first commencement of these hot westerly winds is, *in any part* of *that* country, the unvarying sign of fevers of the very worst and most malignant type, which attack your beasts as well as your men. Captain Sherwill gives a fearful account of the sufferings of his camp there.

I have more than once had my whole camp in fever—bad fever in the morning, while every man had retired the evening before quite well. I did not suffer much from deaths, because I invariably, and at any risk of loss of time, move instantly in such a case, finding that the excitement of the march, the work, the change of air, &c., are the only as well as the best remedy. Now this is universally the case along the Danin, and especially along the more exposed western side; but if there be one place in the hills more unequivocally of *ill fame* in such ways, it is the Panhwara Pass, which lies immediately under Mowagharria. Kendwa, the village just at entrance of this Pass to the west, is notedly unhealthy. Pontet could not get a darogah to live there. Amrapara, at the other end of the Pass, is equally so. Detachments of Sepoys, &c., were there, and European assistants also, during and after the Sonthal disturbances, and *all* left from illness. I have been obliged myself to visit Kendwa three times, and *every time* I came away with fever, and I am not a feverish subject. Last year I got at *Kendwa* and up Mowagharria so sharp an attack, that had I not been ordered up to Nynee Tal, I should have gone away somewhere to shake it off. My assistants have been equally attacked. Mowagharria hill-top also is deserted, excepting at the eastern end, where the village of Pokureea remains. Traces of dozen of other villages can be seen on the top of the hill, all avowedly deserted, because the men died off. I do not give this as any positive proof of unhealthiness, because those Paharias think nothing of deserting a village if a man dies off suddenly at any time, believing this death to be a warning from their spirits, deities, or demons, to leave the place. But it has occurred more than once—villages have been renewed and again deserted.

Experience therefore leads me to be convinced, that any attempt to use Mowagharria as a Sanatarium *must* be a failure, and even more than a mere failure."

From Lieutenant Colonel C. B. Young, Secretary to the Government of Bengal, in the Public Works Department, to the Secretary to the Government of India, Military Department,—(No. 1415, dated Fort William, the 3rd April 1861.)

In your letter No. 952, dated the 10th February 1860, relating to the subject of the establishment of Sanataria for European Troops,

it was stated that particular attention should be paid to the geology of any district where a Sanatarium was proposed to be established, as liability to fever depended as much upon the character of the soil, and geological sub-strata, as on the height, or any other circumstance.

2. Accordingly, as stated in the 9th paragraph of my letter No. 2712, dated the 9th July last, Professor Oldham, Superintendent of the geological survey, was called upon to furnish such information as was obtainable from the records of his department, in regard to the geological formation of those special localities and hills where it has been proposed to establish Sanataria.

3. A letter has now been received from Professor Oldham, No. 465, of the 19th ultimo, copy of which is herewith forwarded for the information of the Government of India, in which he states his inability, as well as the inutility, for reasons assigned, of furnishing any general report of the nature alluded to.

From Thomas Oldham, Esq., L. L. D., Superintendent of the Geological Survey of India, to Lieutenant Colonel C. B. Young, Secretary to the Government of Bengal, in the Public Works Department,—(No. 465, dated the 19th March 1861.)

Colonel Young, to Superintendent of Geological Survey, No. 2216, dated 5th June 1861.
Ditto to ditto, No. 1040, dated March 16th, 1861.

Adverting to the correspondence noted in the margin, I beg to state, for the information of the Hon'ble the Lieutenant-Governor of Bengal, that so far as I am aware, no such general or necessary connection exists between the geological structure and the healthfulness of a locality, as would enable an opinion, based solely on a knowledge of such geological structure, to be safely formed *a priori*, as to its sanatory peculiarities. It is unquestionably true that the dampness, the bleakness, the character of the soil, the drainage, and the supply and purity of the water, as well as several other conditions which materially affect the salubrity of any locality, may be, in many cases, almost directly attributed to certain peculiarities in its geological structure, still it is obvious that the influence of the latter is not *immediate*, and that the existence or evil effects of the former can be, or at least ought to be, as easily ascertained by any other intelligent observer, as by a geologist. Certainly, the very pursuit of geological enquiries tends to accustom the eye and the mind to

trace out that relationship of cause and effect, and thus to facilitate his reasoning correctly from such premises in particular cases, but nothing further. There is no such necessary or universal connection between the geology and the salubrity of all localities as would enable him to predict results in a general way, applicable to all places, whether these were favorable or unfavorable. Each locality must be examined for itself, and its own peculiarities determined.

I may give an instance. In the papers relative to sanatory establishments submitted with your letter, I find (page 58) a brief description of the geology of Kussowlie. "The soil is light and porous, resting on a geological basis of primary lime and sandstone, with gneiss and tufa interspersed on the surface." It would be difficult to invent a description more entirely inaccurate than this is, and yet I am unable to see that, even if perfectly correct, there would have been any *necessary* influence, evil or otherwise, resulting therefrom on the salubrity of the station.

Again, there is in many cases such a connexion between the geological structure, and the comparative healthiness of localities, that a knowledge of the former will offer means of greatly improving the latter, at a trifling cost. But this too, is not of a *general* nature, but is dependent on the peculiarities of each individual place.

While, therefore, I shall at all times be happy to afford every possible information regarding the structure of any definite locality which the Lieutenant Governor may desire to have examined, I am unable to offer any general observations which could be of much service, and which would not, in fact, consist of almost self-evident propositions, patent to most intelligent persons who might visit the poposed place.

From Colonel A. BECHER, C. B., Quarter Master General of the Army, to the Secretary to the Government of India, Military Department,—(No. 149C, dated Head Quarters, Calcutta, the 28th March 1861.)

I AM desired to state, that at the end of October last, on the occasion of his visit to Parusnath, the Commander-in-Chief observed on the distance bearing west-south-west the high hill of "Lugoo;" and having heard from well-informed local authorities, that although wild and covered with forest, it possessed advantages, as regards water and

other essentials, Sir Hugh Rose obtained the permission of His Excellency the Viceroy to have it surveyed by Captain Thompson, of the Revenue Survey, and the accompanying detailed report and plan prepared by that officer of the hill in question, will inform Government of the result, which the Commander-in-Chief considers highly satisfactory.

2. The water on Lugoo is plentiful and good; the elevation of the hill is considerable for Lower Bengal; and its surface will admit the reception of 200 men; whereas Parusnath, under the present condition of occupancy will, at most, accommodate only about 50 men. The only apparent objection to Lugoo, its being surrounded by forest and jungle, will decrease gradually on its occupation. Looking then at the great advantages which the position of such an elevated hill will hereafter offer as a Sanatarium for the sick Soldiers and other residents of Lower Bengal, Sir Hugh Rose ventures strongly to recommend that an experimental trial of its salubrity be made in the same manner as was proposed in your letter No. 16, dated 1st February 1861, of the hill of "Mowaghurie;" and as the locality of Lugoo is specially convenient to Hazareebaugh, Sir Hugh Rose desires to suggest that a Medical Officer from that station, if available, and a small party of men whom he might select from Her Majesty's 77th Regiment, with one or two ailing Officers of the same Corps, may be sent, as soon as practicable, with a subordinate of the Department of Public Works, and some coolies to clear the jungle, and to provide the necessary temporary shelter.

3. Should His Excellency the Governor General concur in these proposals, it will be desirable that the earliest intimation should be given to the Local Civil authorities to make the necessary arrangements for food and other necessaries.

4. The return of the enclosures with your reply is requested, and a copy shall be hereafter furnished for your office.

From Captain G. H. THOMPSON, Superintendent, Revenue Survey, Chota Nagpore Division, to Colonel A. BECHER, C. B., Quarter Master General of the Army,—(No. 386, dated Camp via Hazareebaugh, the 31st December 1860.)

Object of the survey and report on the Lugoo range.

I HAVE the honor to forward you, for submission to His Excellency the Commander-in-Chief, the following report (accompanied by a detailed plan) on the hill range situated in this division called "Lugoo," the survey and exami-

nation of which, with a view to ascertaining the capabilities of the localty for a Sanatarium, I have lately completed, in accordance with His Excellency's desire, as verbally expressed to me at Hazareebaugh, at the end of October last.

How locally situated.

2. The Lugoo range situated 25 miles south-east of the station of Hazareebaugh, and 8 miles north of the Damoodah river, is one of an extensive irregularly shaped mass of hills, running east and west, that skirt both sides of the Damoodah river, from its source (near Toree in the Chota Nagpore district) right down through the southern portion of the Ramghur estate, and the Hazareebaugh district.

Geographical position.

3. By the Grand Trigonometrical Survey of India, the summit of Lugoo, which is at the north-west corner of the range, is in latitude 23°46′ 55·6″N. and longitude 85°43′44·1″E. Having been taken up as a *secondary* point, the elevation of the range was not calculated by the G. T. Survey, but from the data for the neighbouring *principal* points, that have been furnished to me by Major Thuillier, Deputy Surveyor General; and from my own observations at Lugoo, on these G. T. S. principal points, I have computed the elevation of the highest point to be 3,472 feet above the sea level. The extent of the range at the base is 6 miles long by 2½ miles broad; the top irregular surface being about 5 miles by 1½ miles.

Elevation above the level of the sea.

Extent of the range.

Lines of access from the neighbouring stations and from the Trunk Road.

4. The approach to the hill, from all sides, lies through very dense jungle and broken uneven ground. The old Calcutta road which runs through Midnapore, Bancoorah, and Hazareebaugh, and joins the present Trunk Road at Shergotty, passes north of Lugoo at about the distance (through such a country) of a day's ordinary march. There is also an old road that leaves the present Trunk Road at "Rangamattee" (about 6 miles north-west of Parusnath) near the 200th milestone from Calcutta, and joins the old Calcutta road at "Goomiah," which is also distant from Lugoo about a day's march. These marches however take you to the north and east sides of the hill, and another march is necessary to get round the village of "Moorpah," at the south-west base of Lugoo, from whence the ascent up the hill commences. By the old Calcutta

road, "Moorpah" is distant from Hazareebaugh four marches, over very tough ground, but this is not the proper route between the two places. There is a road over better ground, more to the south, and in a more direct line, by which the distance can easily be marched in three stages, one from Hazareebaugh to Churhee, the second from Churhee to Bussutpoor, and the third from Bussutpoor to Moorpah, *vide* diagram in the margin.

Present paths or tracks up the hill, with remarks as to where new roads could be made.

5. As noticed in the preceding paragraph, the hill is ascended from the south-west corner or base from the village of "Moorpah." From this point the ascent is gradual and easy. The present path or track runs up with very little winding, and could easily be made into a good road. The village of "Moorpah" is about 1,000 feet above the sea, consequently the rise up the hill is close upon 2,500 feet. It takes about 2½ hours to walk up quietly, and about 1¼ hours to come down. The range cannot be ascended from any point on the northern or western faces, which are both abruptly scarped. A road could be made up the eastern face, also from other parts of the southern face; and tracks to wood-cutting localities (none of which however are more than 500 feet up the range) already exist on the eastern and southern faces.

General appearance or description of the top.

6. From the top, the range has a very different appearance to what you are led to expect on viewing it from any quarter below. The general surface of the top is broken by several ranges and valleys, as shown on the plan, all of which incline to the south and east. The northern ridge is about 400 feet higher than the southern ridge, and the eastern end of the range is not more than half as high as the western end. The fall to the east, however, is very gradual, and is little or nothing, for the first 3 miles from the western ridge. There are several level spots (as noted on the plan) on this three miles of high land, that are suitable for building on. The plateau marked A, on the north-west corner of the range, and called "Kajooria Berah," or date grove, of 60 acres extent, the elevation of which is 3,000 feet above the sea, is, in every way, the best piece of building ground on the whole hill. It is remarkably level, and of all ground on the hill, the most free from rock. The spur immediately above it to the east, on the very summit of the range, is also adapted for building purposes, and on it there is room for at least 6 detached

Area and position of Table Land or ground suitable for building sites.

Bungalows, or an extensive range of Officers' quarters. Both, plateau and ridge are now covered with forest, as is the whole range. The other level spots, B, C, and D, varying in size from 5 to 12 acres each (*vide* map), although they might be considered as too low in elevation for barracks or a Sanatarium, are nevertheless conveniently situated for other public buildings, such as commissariat store-houses, &c., &c.

Water supply.

7. Water is procurable from four different places on the range, as follows :—

Water No. 1.

First.—From the "*Lerwah*" spring half way up the hill, on the track from Moorpah, elevation about 2,200 feet. Although the present supply from this spring is small, the natives informed me that it was never dry at any season of the year.

Water No. 2.

Second.—From the "Pokree" or tank, a natural cavity, formed in a sandstone rock from a small but constantly flowing stream running north and south across the range. The Pokree is in the centre of the western valley of the range—elevation about 2,500 feet. The cavity is of an oval shape 16 feet long by 10 feet broad, and 8 feet deep, thus containing about as much water as an ordinary well. The natives informed me that it always remained full.

Water No. 3.

Third.—From the "Jogee Luttah" stream, a considerable body of running water, about a mile east of, and separated by a hill ridge from the Pokree stream just described. This, the Jogee Luttah stream, comes from the northern ridge, runs down south-eastwards to near the southern ridge, when it turns off to the north-east, and after running in that direction for about a mile, again turns south-east, and runs down nearly the whole length of the range, making its exit on the plain, at the south-east base of the range, where it is called the "Dhurdhurwa." The elevation of this stream at the cave of "Lugoo Deota" (*vide* map) is about 2,300 feet.

Water No. 4.

Fourth.—From the "Putree Pukhan" stream, running north and south in a valley about 2 miles to the east of the Jogee Luttah source. The Putree Pukhan runs into the Jogee Luttah near the southern ridge of the range. The elevation of this stream, at the centre of the range, is about 2,400 feet.

8. The first two of these spots, where water is procurable, are distant ¾ of a mile from the plateau A. By made roads the water could be brought up to plateau A in fifteen minutes by ponies with pukhalls. Plateaus B, C, and D are all near water. The supply of water from the "*Lerwah*" spring and from the "*Pokree*," would be ample for the drinking and cooking purposes of 200 men stationed on plateau A. The supply from these two places only would not be sufficient for bathing and washing purposes; but a large masonry reservoir, which would fill during rain, could easily be built in a suitable position on or near the plateau. Plateaus C and D would have an inexhaustible supply of water at all seasons from the "Jogee Luttah" stream.

Distance of water from level ground, and facilities for decreasing the same.

9. The qualities of all these waters have been approved by a Committee of Medical Officers which the Officer commanding at Hazareebaugh was good enough, at my request, to order to assemble for the purpose of analyzing and reporting on them. Copy of the Medical Committee's report is annexed to this report.

Quality of the water approved of by a Medical Committee.

10. The temperature of the air, as it always is on all salubrious elevated lands, was more even and regular throughout the day and night (the nights and mornings being drier and warmer, and the days cooler) than the temperature of the plains below. For the five days and nights (from the 10th to 15th December,) that I was on the top of Lugoo, the mean readings of the thermometer, under a small Shouldâree tent pitched in the open, stand as follows :—

Mean temperature of the air on top, for morning, noon, sunset, and night of five days.

Sunrise 52°—Noon 67°—Sunset 59°—8 P. M. 53°.

11. The rock formation on the hill is very remarkable; it is very much contorted and shattered, and at every turn most curious traces are apparent of the severe volcanic disturbance that has taken place. The rock is chiefly sandstone and quartz. The whole range abounds in huge sandstone caves. That of Lugoo Deota, alluded to in para. 7, and shewn on the plan (at the foot of a ridge just over the Jogee Luttah stream), is a most extraordinary wild looking place, and is appropriately called the residence of the imagi-

Rock formation.

Lugoo Deota's cave.

nary god Lugoo. It measures 40 paces in length by 18 broad, and is about 15 feet high in the centre, with entrances at three sides, that two or three men together can esily walk through. The rock overhead is about 30 feet thick, and there is a huge rent in the centre.

Sandstone, quartz, and granite.

12. Generally speaking the whole range is covered with shattered sandstone and quartz rock, which is pierced every here and there by granite peaks or columns, some of which have a very bold and imposing appearance. There being but little soil, there is not much underwood or jungle, nevertheless the forest is very extensive, and at many places very beautiful. The trees are mostly "*sukwa*" and "*asun*," but there are few species of Indian trees that are not represented on Lugoo.

Little or no soil, and scarcity of jungle vegetation.

Extensive forest of sukwa and asun trees.

The sukwa and asun grow to great heights, and are far more numerous than will ever be required for any amount of building on Lugoo, or in its vicinity. The natives have never hitherto cut any of the large trees from the top or near the top of the range, as they have no means of getting the wood down the hill. Trees in great numbers are constantly being cut all round the base of the hill, and for about 500 feet up the south and east faces. They are now chiefly taken to Burdwan by rafts down the Damoodah, where railway sleepers from Lugoo sell for Rupees 2 each. When the station of Hazareebaugh was being built, Lugoo supplied a great quantity of the wood.

Present use made of the wood.

Freeness of the range from Temples or other places of Native worship.

13. With the exception of the cave of Lugoo Deota, and which would not in any way interfere with the purposes for which Government would occupy the range, there is no part of the hill or range that is considered by the natives to be sacred. Even the cave itself is very seldom visited, only once or twice a year, as far as I could ascertain, in the months of April or May, when the tribes in possession of the villages below have their annual hunts, before starting on which they make their offering to the god Lugoo. If successful in the chase they again perform worship, and in this case they

Mode of worshipping the god Lugoo.

offer up a little of the blood of the animal killed, or some of the spirits with which they have their jolification.

Tribes in possession of the villages at the foot of the range.

The tribes in possession of the surrounding villages are "Sonthals," "Bhooniahs," "Bhoogtahs" and "Ghâtwars," all of "*Bhoodist*" origin. They none of them reside on Lugoo. The range is

The Lugoo hill in whose possession.

situated in an estate of 30 villages, held in jaghir from the Maharajah of Ramghur, by Thakoors "Radhanath Deo" and "Gunput Deo"; the former of "Sarum," whose villages adjoin the southern face, and the latter of "Hosir" whose villages touch on the northern face.

14. As may be concluded from what has already been written, the

Derivation of name Lugoo.

range derives its name from the "*Deota*" or god "*Lugoo*" of the tribes named in the foregoing paragraph.

15. Of wild animals on the range, I saw unmistakable signs of the

Wild animals or game on Lugoo or surrounding jungle.

following :—"Sambur" deer, bear, pig, porcupine, ape, monkey, hyena, wolf, and leopard. There are very few birds. I saw only a few parrots, and a couple of double-spur painted partridges. The natives informed me that most of the large game leave the hill for the plains during the cold season, and this I believe to be the case, as I had a grand hunt the last day I was on the hill, and saw nothing ; although I had no difficulty in driving out a couple of bears (and shooting one of them,) two days afterwards at the foot of the range.

16. The only drawback to the locality for a Sanatarium that I can

Favorable opinion on the site for a Sanatarium.

see, consists in the density and extent of the jungle on the surrounding country. The site itself is a noble one, and the air on top is undoubtedly fresh and pure, and such I should think as is calculated to speedily renovate the impaired health of invalids from the plains of Bengal or Behar. The natives informed me, that they were seldom troubled with sickness of any kind; and if proper precautions were taken, as doubtless they would be, to prevent invalids being sent either to or from Lugoo, during or immediately after the rains, the bad effects of the surrounding jungle might be little felt. There should be no difficulty about supplies for 200 men, as, although the neighbouring jungle is, ge-

nerally speaking, very dense, it is nevertheless inhabited, and every patch of good low ground has been cleared, and is now under cultivation. The valley of the " Bôcárah" nullah which runs close to, and north of Lugoo, is richly cultivated for a limited breadth. The valley of the " Damoodah" is also fairly cultivated, and cattle and fowls abound all over the Ramghur estate. The present inconvenience in the distance of water from the best plateau of level ground, can be easily remedied by the construction of roads and reservoirs ; so that, on the whole, I think I am safe in recommending Lugoo as a suitable site for a Sanatarium or convalescent depôt for 200 men.

Proprietor and tenants pleased at the suggestion.

17. In conclusion, I may also state that, from conversation I have had on the subject with the Maharajah of Ramghur, and with the Jaghirdars of " Sarum" and " Hosir", they all appear well pleased at the idea of a Sanatarium being formed on the range.

Proceedings of a Committee of Medical Officers held by order of Lieutenant Colonel the Honorable A. CHICHESTER, *Commanding the District, to analyze and report upon certain waters to be submitted to it by Captain* THOMPSON, *Superintendent of Revenue Survey.*

HAZAREEBAUGH, *the 22nd December* 1860.

PRESIDENT :

Staff Surgeon CLARKE, *Her Majesty's 77th Regiment.*

MEMBERS :

Assistant Surgeon HUMFREY, *77th Regiment.*

Assistant Surgeon RAMSAY, *37th Regiment.*

No. 1.

The Committee having assembled and examined water in a bottle No. 1, from Lerwah spring, reports as follows :—This water is clear and sparkling, free from odour, " hard," but agreeable to the taste. Specific gravity 1002. On adding a solution of nitrate of silver, a scarcely perceptible precipitate was formed. On adding sulphate of barium, sulphuretted hydrogen was evolved, and the water was darkened in color, indicating

the presence of lead. On adding oxalate of ammonia, a very inconsiderable precipitate of lime was observable. On adding feriocyanide of potassium, no change took place.

Opinion No. 1.

The Committee considers this water very good, and suitable for the use of Troops.

The Committee next examined water in a bottle marked No. 2, from the Pokree, a rock cavity in the hill Lugoo. This water is clear,

No. 2.

sparkling, soft, and slightly bitter to the taste; (this latter quality is probably referrible to the water having passed over some bitter vegetation, &c.) Specific gravity 1001. On adding nitrate of silver, no change took place, which indicated the absence of organic matter. On adding sulphate of barium, sulphuretted hydrogen was evolved, which indicated the presence of lead. On adding oxalate of ammonia, no change took place, which indicated the absence of lime. On adding feriocyanide of potassium, no change took place, which indicated the absence of iron.

Opinion No. 2.

The Committee considers this water very good, wholesome, and suitable for the use of Troops.

No. 3.

The Committee next examined water in a bottle No. 3, from the "Jogee Luttah" stream.

This water is clear, soft, and agreeable to the taste. Specific gravity 1002. The addition of nitrate of silver produced no change. Sulphate of barium produced no change. Oxalate of ammonia produced no change. Nitrate of silver produced no change. Feriocyanide of potassium produced no change.

Opinion No. 3.

The Committee considers this very good, wholesome, and pure water, and in every way suitable for Troops.

No. 4.

The Committee next examined water in a bottle No. 4, from the Puttree Pukhan stream.

This water is clear, soft, and agreeable to the taste. Specific gravity 1001. The addition of nitrate of silver produced no change.

Sulphate of barium produced no change. Oxalate of ammonia produced no change. Feriocyanide of potassium produced no change.

Opinion No. 4. The Committee considers this water very good, wholesome, and pure, and in every way suitable for Troops.

The Committee is doubtful about the existence of lead; but if any of the above waters contains it, it is in so small a quantity that the Committee does not hesitate to say that it could not be injurious, and that all of them (the 4 waters) are good, wholesome, and suitable for the use of Troops.

From Major F. D. ATKINSON, Deputy Secretary to the Government of India, Military Department, to the Quarter Master General of the Army,—(No. 437, dated Fort William, the 12th April 1861.)

WITH reference to your letter No. 149C, dated the 28th ultimo, I am desired to acquaint you, for the information of the Commander-in-Chief, that the Right Hon'ble the Governor General in Council is of opinion, that the experiment of Lugoo should not take place this season. Darjeeling is about to be tried on a large scale; Hazareebaugh remains available; and the experiment is sure to be productive of considerable expense, where the country is so thoroughly unreclaimed as in this case, and every thing requisite for the establishment of the men will have to be brought from a distance.

The enclosures of your letter are herewith returned as requested.

From Colonel O. CAVANAGH, Governor of Prince of Wales Island, Singapore, and Malacca, to the Secretary to the Government of India, Military Department, Fort William,—(No. 119, dated Singapore, the 19th June 1861.)

WITH reference to your office despatch No. 952H, dated 16th February 1860, I have the honor to forward herewith, for submission to the Right Hon'ble the Governor General in Council, transcripts of reports* from the senior Surgeon, Straits Settlements, and Executive Engineer, Prince of Wales Island, upon the capabilities of a site selected by me on the range of hills in rear of the town of Penang as a Sanatarium for European Troops.

* No. 1.

2. Since the plan transmitted by the Executive Engineer was taken, another piece of ground, of considerable extent, has been cleared on the left hand side of the road; this would enable separate barracks to be erected for the married Officers who might be attached to the depôt.

3. I fully concur with Doctor Rose in thinking that, although in cases where organic disease, owing to a long residence in a tropical climate, or other causes, has made considerable progress, little advantage would be gained by sending the Invalid to the Penang hill. Much benefit would accrue from the despatch thither of those men who may be what is commonly called ailing, and whose constitutions might be restored by removal for a season from the debilitating climate of lower Bengal, or even of the plain stations in the Straits.

4. The scenery of the Penang hill is most picturesque; there are several walks in the neighbourhood of the proposed site for the Sanatarium; and although the sun during the middle of the day is powerful, Europeans could work in their gardens with ease every morning and evening, whilst even in the day time the heat in the shade is never very oppressive, and the nights are generally cold enough to render a blanket absolutely necessary.

5. Beef and poultry are procurable from the island, districts, and province Wellesley; but some arrangements would have to be made by the commissariat for supplying the Troops with mutton. On this point, however, there ought to be no difficulty, private enterprise having succeeded, although certainly at high rates, in providing mutton from Bengal and China, for the consumption of the European community at Singapore. Where no profit need be required, these rates it is believed, would admit of considerable reduction.

6. Should the Supreme Government deem it advisable to sanction the experiment of establishing an invalid depôt at Penang, the necessary plans and estimates for the buildings required, shall be transmitted with all practicable despatch, for consideration in the Public Works Department.

Observations by J. Rose, Senior Surgeon, Straits Settlements.

1. The following observations are made in compliance with instructions contained in a letter No. 155, to my address, from the Secretary to the Governor of the Straits Settlements, dated Singapore, 15th June 1860.

As the topography of Penang has been so ably described by Dr. Ward of the Madras establishment, Captains Low, Begbie, and Newbold, and others, I shall confine my remarks almost entirely to the Medical topography of the hills, with special reference to the advantages its climate holds out as a Sanatarium for European Troops.

2. Pulo Penang or the "Areca Palm Island," is situated towards the western end of the Straits of Malacca, and separated from the main land of the Malayan peninsula by a channel about 2½ miles broad, and lies between 5° 15′ and 5° 29′ north latitude, and 100° 21′ east longitude; is about 15½ miles long by 7 to 8 broad, and is computed to contain about 160 square miles. On the eastern side, from the Tanjong or point on which the fort and public buildings are erected, there is a plain, or as it is called, "The Valley," extending inland about three miles to the base of the hills, of which there are several ranges running through the centre of the island, taking a direction from nearly north to south, and varying in height from east to west; the western hill being the highest, 2,600 feet, nearly all the hills appear flattened, and want the peaked appearance so characteristic of granitic formation. Several have extensive plateaus on their summits, on which the residents have built cheering villas, to which they resort to escape the heat of the valley during the warm months, or to recruit their health when prostrated by disease: Government house, or "Bel Retiro," is on one of the highest. The hills are easy of access either in the saddle, chair, or doolie, or even on foot; the latter, however, could not, as a general rule, be undertaken by Europeans, as the change of climate is so sudden from the oppressed atmosphere of the valley to the rarified elastic air of the hill, that the respiratory organs and action of the heart become so accelerated, and the muscular exertion is so great, that I should dread disease of the lungs, heart, or large vessels, might be induced, by frequent repetition of such violent exercise. The scenery from the hills is magnificent and picturesque in the extreme, unsurpassed by any spot on earth. The hill on which it is proposed to build the Sanatarium is about 2,450 feet high, and if there is available space, offers an excellent site for a "Sanatarium."

I have often wondered why the Penang hills are not more resorted to by Europeans from this settlement and Calcutta: the advantages they hold out to the valetudinarian cannot be over-rated.

3. *Geological formation.*—The hills are one mass of primitive rock, chiefly a greyish colored granite, traversed here and there by views of quartz rock. The sub-soil is formed by the decomposition of the rock below, is of a light red color, in some parts clayey, others sandy, varying from one to twelve or fourteen feet in depth, and is covered with a thin vegetable mould from six to twelve inches in depth. Many are still covered with dense primeval forests, others have been denuded of their natural covering by the ruthless squatter, who, in my time even, were permitted to burn down those magnificent trees to any extent; the immense amount of rock thus exposed to the solar rays has, in my opinion, in no way improved the climate of Penang generally: the last few years I resided there seemed warmer, and the seasons less regular. This wholesale destruction of the jungle, I am glad to hear, is now forbidden.

4. *Hydrography.*—Penang has no river of any size at all; abundance of excellent water, however, pours down from the hills to the sea, sufficient for all purposes; and if I mistake not, the water-fall, the resort of all who visit Penang, takes its rise on, or very close to, the hill on which it is proposed to build the Sanatarium, so that I presume (as I write from Singapore) there is abundance of water for the use of the Troops.

5. *Climate.*—The valley though warm during the day, is very much superior to any part of Lower Bengal, as the mornings and evenings are comparatively cool, and it is seldom that heat is complained of at night, yet it is inferior, by universal consent, in climate, to the eastern settlements, Malacca and Singapore: I allude to the valley of Penang only. The Straits climate generally agrees well with Europeans: during my residence of 13 years in Penang, with an average strength of 60 Europeans in the fort, I do not think there were more than twelve deaths, and few of these could be attributed to the influence of climate or local causes, but mostly to the habits of the men, who were careless to a degree as to exposure to the sun, and many freely indulged in arrack, &c., supplied them in abundance in the bazar; but I am digressing.

Penang feels the influence of the regular monsoons much more than Malacca or Singapore, from its vicinity to the Bay of Bengal, and the greater width of the Straits to the westward: during the north-east monsoon, from November to March, clear settled weather prevails, and in the south-west monsoon, from April to October, the rains take place,—not that it rains constantly, but that it forms the predominant feature. The months

of July, August, September and October, are those in which the greatest quantity of rain falls.

The thermometer in the valley ranges from 76° to 88°, and in the higher hills from 64° to 76°, and during the months of November, December, January, and February, the hill climate is unsurpassed, the sky clear, air cool and invigorating, the scenery enchanting, exhilarating both to mind and body.

6. *Diseases for which the Hill climate is adapted.*—During the four months abovementioned, diseases of the liver, stomach, and bowels, excepting acute dysentery, do well: the same remarks apply to rheumatic and syphilitic affections. The rainy months are not suited to these diseases, being too damp and cold.

The climate is peculiarly adapted all the year round, for all pulmonary and bronchial complaints—and is frequently compared to that of Funchal, in Madeira—and to the convalescence from fevers, the general debility, exhaustion, and state of atrophy so common amongst Troops, the effect of climate—these cases do remarkably well. Of course attention must be paid to clothing, and wet and damp avoided as much as possible.

Gun-shot and other wounds heal up kindly, especially during the four favorable months.

In conclusion, I consider the Penang hills hold out great advantages as a Sanatarium for European Troops stationed in any of the Straits Settlements and Lower Bengal. The sea trip to and fro, and two or three months' residence on the hills, I feel certain, would restore many a man to health, that would otherwise succumb to the climate of Bengal. This, however, should be borne in mind, that the invalid is not to be kept, as is too often the case, in the inimical climate, until organic disease has made considerable progress, or the constitution so broken up by repeated and protracted illness; under these circumstances, permanent recovery is hopeless by any change of climate.

From Captain G. T. HILLIARD, Executive Engineer, Prince of Wales Island, to the Officiating Chief Engineer, Straits Settlements—(No. 267, dated Penang, the 3rd April 1860.)

I HAVE the honor to acknowledge receipt of your letter No. 110, dated 22nd March; and in accordance with the instructions contained in letter from Secretary to your address therein alluded to, I beg now to submit for his information, the following particulars regarding the pieces of ground known as the "Plantations," on the western hill road on the great hill Penang, with a view to the capabilities of forming a sick depôt.

2. The "Plantations" consist of two pieces of ground, one on the right and the other on the left of the western hill road, about half a mile from Government house.

3. The piece of ground on the right hand side going towards the western hill, consists of two hills, one conical and the other flat at the top, connected together by a narrow strip of land 420 feet long, but not broader than 30 feet in its broadest part, and 10 in its narrowest. There is a good bridle path all round the base of the whole, nearly a mile in length.

4. Water is to be had at the bottom of a dell at the farthest end, at a depth of about 50 feet.

5. The small conical hill is capable of containing a building 70 feet long by 40 broad; and by building an upper-storied house on this hill, there would be sufficient accommodation for about 30 married couples.

6. The second hill has a fine level space 190 × 120 for building on, that is, there is sufficient space for a building of those dimensions, and this would accommodate 100 Soldiers comfortably, and double that number if built with an upper story; but for a building of that size I do not think an upper story would be safe, unless brick throughout, and the expense of that would, of course, be very great.

7. The out-houses for the two Bungalows could be distributed over the sides of the hill, and on the connecting neck of land.

8. The piece of ground on the left hand side of the road leading to the western hill, that is to say, that portion of it styled the "Plantation,"

is an irregular piece of a ridge of a hill terminating in a flat narrow piece at the end. It is about 200 feet long and the broadest part 40. Accommodation could easily be found here for two married and 4 single Officers.

9. A plan of the two pieces of ground is herewith enclosed.

From Dr. J. Forsyth, Principal Inspector General, Medical Department, to Major General Sir R. J. H. Birch, K. C. B., Secretary to the Government of India, Military Department,—(No. 2029, dated Fort William, the 4th March 1861.)

In acknowledgment of your letter No. 1076, of the 26th July last, transmitting the papers noted in the margin, relative to a site selected on the Penang hills, and considered suitable for the location of an invalid depôt, for the reception of sick men from the Troops in Lower Bengal, and directing me, in communication with Officiating Inspector General McClelland, to submit my opinion on the expediency of establishing such a depôt at Penang, and whether the benefits likely to result from such a measure would be, in degree, commensurate with the outlay which would be incurred in carrying it out, I now beg leave to submit, for the consideration of His Excellency the Right Hon'ble the Governor General of India in Council, copies of two communications which I have received from Dr. McClelland upon this subject.

Letter No. 119, dated 19th June 1860, from the Governor of Prince of Wales Island, with map and enclosures.

2. Unfortunately, neither Dr. McClelland nor I have visited the locality, and it may perhaps be considered advisable that Dr. McClelland should visit it, before it is decided either to adopt or to abandon the project now under report.

3. Copy of a brief report upon the Penang hill, by Assistant Surgeon A. V. Best, who has paid some attention to the selection of sanatory stations, and who is acquainted with the spot, is also annexed.

4. The plan herewith returned, shews that the available space at the top of the hill is very inconsiderable, and it would appear that the neighbouring jungle is of considerable density, and that extensive additional clearing would be required, before the hill tops could be occupied with advantage. Old experience appears to de-

monstrate, that this operation is attended with risk, and requires considerable care, and that newly cleared ground in these situations, cannot be occupied with safety.

5. In his contributions to the Medical topography of Prince of Wales Island, Dr. T. M. Ward, of the Madras establishment, the most reliable authority upon the Medical history of this locality, states* that " Roads were cut through the forest by incredible " labour with great ingenuity, and at considerable expense. The " summits of all were gradually cleared, and now houses, and spice " plantations occupy the place of the useless forest which once co- " vered them. Nor was this achieved with impunity to the enter- " prising speculators. Many of them from exposure, partly to the " weather, and partly also to the miasmata from the decaying wood, " and newly cleared earth, were attacked with a severe and fatal form " of fever to be afterwards described. Experience has shewn, that " spots newly cleared do not become perfectly healthy, until, at " least, three years have elapsed from the cutting of the wood. To " this probation the range of hills now under review has been " submitted, and he who adopts the precautions which common sense " points out, for avoiding the mid-day sun, and exposure to the " night dews, may reside with as great safety on them as in the " valley."

* Page 2.

Again, " It is one of the many curious facts relating to miasma " too, that the very means taken for its destruction are sometimes the " cause of its acting more virulently on the human body. This is " more especially the 'case within the tropics in low swampy places " near the sea coast. Fever was more frequent and severe after " clearing Penang in 1801 and 1802, so that it may be considered as " a general approximation to the truth, that low and marshy situations " become still more unhealthy, when the trees and woods upon or " around them are cut down, unless they are subjected to a careful drain- " age and cultivation, and even for the first two or three years of such " culture, they are at particular seasons productive of disease.' The " cutting down of woods, clearing the country, and more especially the " hills, have been occasionally a cause of fever here of a virulent nature. " Some years ago a party of about 20 lascars, under the command of " Captain Poynton, engaged in cutting a water-course through the

"dense forest, and marshy soil on the south-west side of Penang, near "Pigeon Island, was completely cut off to a man by remittent fever, "and the Superintendent himself, when nearly moribund, was saved "by proceeding to sea. Other instances of the same kind, but not "of such severity, have occurred among men similarly employed, but "the same happens in very part of India, and the disease induced "seems not to have differed in any respect from the well-known and "dreaded hill fever of the east; a few cases of it also have been ob- "served in delicate females of the higher ranks, who have been residing "on the hills, in whom the occurrence could scarcely be ascribed to "any other cause than the inhalation of miasma. We may here re- "mark that the convicts employed during the last five years in cutting "wood for Government, on various parts of the Island, and in clear- "ing the summits of some hills to the southward of Bel Retiro, have "not been subject to fever, and that scarcely a death from this has "happened among them."

6. So also Assistant Surgeon J. P. Grant, of the Madras establishment, remarked in his "observations on the remittent, nervous, congestive fever," prevalent among Europeans at Penang. "The proxi- "mate cause of this disease, I believe, is a poisonous miasm pro- "duced by the powerful rays of the sun, acting upon vegetable matter "in a state of decomposition, particularly in hills where the jungle "has been cut down and left unburnt. It has also appeared from "many fatal occurrences, that no newly cleared hills are safe places of "abode at certain seasons, for the first three or four years."

7. The original documents are herewith returned.

From Dr. J. McClelland, Officiating Inspector General of Hospitals, Lower Provinces, to the Secretary, Principal Inspector General, Medical Department,—(No. 104, dated 10th September 1860.)

I have the honor, herewith, to return the papers enclosed in your Office memorandum of the 10th ultimo, No. 254.

2. Admitting the climate and ground suggested for a Sanatarium on the hill at Penang to be all that could be wished, still the journey of invalids to Calcutta, their embarkation, the difficulty of providing Medical attendance in individual cases, and of selecting a number of cases likely to benefit by the change to proceed at the same time, the effects of

the sea voyage on debilitated constitutions, and of landing at Penang, and the journey up the hill, are all questions to be taken into consideration, as regards the benefits to be expected from a Sanatarium at Penang

3. Perhaps a system such as that pursued with reference to Mussooree and other hill stations in the North-Western Provinces, could be made applicable with regard to Penang, of sending the invalids for the season, under charge of a Medical Officer appointed for the occasion.

4. The seasons most injurious to debilitated constitutions in Lower Bengal, are the hot season, and that succeeding the close of the rains. This would entail two embarkations of invalids annually from Calcutta, the one in September, the other in February; considering the nature of the cases that would probably be chosen as likely to benefit most by such a change, six months' residence at Penang, including the voyage there and back, would probably be thought sufficient in the majority of cases, so that the vessel taking invalids down might bring convalescents back.

5. It is also to be considered that the violence of the monsoon is much abated in the Bay by the middle or end of September, while the passage in February would in itself be found beneficial in many cases. The arrangements for landing at Penang, and the journey up the hill, could possibly be arranged so as to entail little exposure or fatigue.

6. With regard to the supply of water for the proposed Sanatarium, all that the senior Surgeon of the Straits Settlements says on the subject is, "If I mistake not the waterfall, the resort of all who visit Penang, takes its rise on, or very close to, the hill on which it is proposed to build the Sanatarium."

7. The Executive Engineer, after describing one of the pieces of ground, states that "Water is to be had at the bottom of a dell, at the further end at a depth of 50 feet;" but in what quantity in the dry season from November to March, or at what distance, is not stated. No allusion is made to any other supply of water in describing the second hill.

From Dr. J. McClelland, Officiating Inspector General of Hospitals, Lower Provinces, to the Secretary, Principal Inspector General, Medical Department,—No. 107, dated 27th October 1860.)

With reference to my letter No. 104, of the 10th ultimo, returning papers which had been referred to me, relative to the proposal for a Sanatarium at Penang for invalids from Lower Bengal, I regret to find

that I quite overlooked the question, as to the probable utility of that proposal if carried into effect.

2. I have now the honor, as far as I am able, to supply that omission as regards the general bearing of the question, as it applies to the large European Force now stationed in Lower Bengal.

3. The only Sanatarium at present available is Darjeeling, and although the railway is now extended to Rajmehal, the difficulties of the rest of the way are such as must limit, for some time to come, the utility of Darjeeling as a general Sanatarium for Lower Bengal.

4. Supposing Shillong, the proposed Sanatarium in the Khasyah hills, to be approved of, its utility will be chiefly confined to Troops serving on the north-eastern frontier and in Eastern Bengal, because the nearest accessible point from Calcutta by steam is Gowahatti, which occupies sixteen days with an unfavorable climate all the way.

Parusnath hill wants space and variety of scene.

Mahooaguree hill, near Balasore, is not yet sufficiently known to admit of a definite opinion being formed regarding its fitness for a Sanatarium. The approach to it is believed to be bad.

5. But even if Sanataria already existed at all these places, and the means of access to them was placed on the most approved footing, still there are cases, and these not few, which would derive more benefit from three months' residence on the hill at Penang, with the short sea voyage there and back, than from any ordinary hill climate; and I would particularly mention convalescents from fever and dysentery of Lower Bengal with tendency to relapse, more especially in newly arrived Troops.

6. In this point of view I think the advantage likely to result from a Sanatarium at Penang, would be sufficient to justify the expense as tending to check the excessive mortality, and to promote the efficiency of Troops stationed in Lower Bengal.

7. In point of expense there would be little difference, I apprehend, whether invalids were sent from any station below Berhampore to Penang, or to Darjeeling.

8. In the selection of cases, of course, the disadvantages of the voyage, such as I referred to in my last letter, should be taken into consideration.

Memorandum from Dr. J. McClelland, *Officiating Inspector General of Hospitals, Lower Provinces.*

We learn from these papers that Penang consists of rice grounds and hills of every elevation, from the level of the sea to 2,574 feet.

That remittent fever prevails in the low rice grounds, as well as in the low wooded hills to 350 feet in height, so that persons exposed in these parts to fatigue and the effects of the sun, are liable to this fever, which seems to be the same as the remittent fever of Burmah and of Lower Bengal, of which a large proportion of those attacked died under the old treatment of depletion without quinine.

It is to be remembered, then, that these local diseases, and the topographical accounts in which they are described, refer to Troops located in barracks and in the fort at George's Town, amidst low rice grounds on the marshy coast, and that the several cases detailed were those of Officers and others who exposed themselves to snipe shooting, or to the sun in walking 8 miles to the top of the hill and back again to their barracks near the Town, where the fort, houses, and hospitals were situated.

The object and use of Sanataria were not then known, although the following abstract taken from Dr. Ward's paper on the Medical topography of Penang, shew how nearly his views approached to those of the present day.

The climate of the higher hills, 2,500 feet, is spoken of as equal to that of Mountpelier and Madeira, and that the mean annual temperature of the hill of Penang is 5° Fahr. less than that of the former place. The greatest range of the thermometer in the 24 hours, is only 11 Fahr., and generally only 3 or 4 Fahr.*

The tried advantages of the hill for invalids, " is to restore the natural functions, and to improve the appetite and strength, specially in such as have suffered from the effects of fever, dysentery, and hepatic complaints."

" Instances have occurred repeatedly of patients who were too weak to crawl from their beds" (in the hospital and houses down below) " being able to walk about and enjoy the delightful scenery a few days after their removal to the mountain."

* It is one of the great advantages of insular climates, that the daily variations are slight. Another advantage is, that the radiation of heat is less, so that an elevation of 2,500 in an island such as Penang, would lower the temperature as much as a far more considerable elevation on a continent of heated land.

"The heat," upon the hill, "is never oppressive, even in the middle of the day; every breeze has a bracing effect. The mornings and evenings are so cold as to require exercise to keep up the temperature of the body, and at night blankets are indispensable."

"When proper precautions are taken with regard to warm clothing," and the barracks "being furnished with glass windows, the air of the hill *has been found* highly successful as a remedial measure, in most of the common tropical diseases, when other means have failed."

"To invalids from the Presidencies of India, convalescent from the diseases above referred to, or with chronic diseases of the stomach and bowels, or suffering under general debility from any cause, this might be suggested as an eligible place of resort, and in many instances might supersede the necessity of a voyage to the Cape or to New South Wales," or it may be added to England.

At most seasons, especially when Madras and Calcutta are both unpleasant places of residence for persons laboring under sickness, the communication with Penang is frequent. The voyage down or across the Bay, with two months' residence on the hill, would restore the worn-out constitutions of invalids.*

* The China steamers only take 5 days from Calcutta to Penang, and go and return monthly. It is only a few days from Port Blair to which Government steamers now pass regularly.

"The distance from the landing place to the foot of the hill is inconsiderable, and the ascent as before mentioned is easy."

"Supplies are readily obtained from George's Town by coolies, and the expense of living are not much greater than below."

"The top of the hill affording a most romantic and picturesque view, also affords to the invalid room for exercise either on horseback or on foot, for a distance of 2 miles, on a nearly level but winding road, from Bel Retiro to the western hill, 2,574 feet.

Memorandum from Assistant Surgeon A. V. Best.

In the island of Penang we have the different phases of temperature, from that of a hot tropical sea level to that of a 3,000 feet elevation. The heights are well wooded, with, on the summit, several excellent plateaus for the erection of larger sanatory buildings.

Various water courses and valleys run down towards the plain, are occupied towards the foot by groves of clove and nutmeg plants. On the sum-

mit of several heights—for the great hill rises in various elevations from 1,500 to 3,000 feet—are various Bungalows occupied by the residents at Penang and Singapore, who resort thither for change of air. Plenty of water is to be had, and of excellent quality, and an excellent road leads to the summit of the central and western heights.

No doubt for a moment can exist as to the great benefit to be derived from a change to the elevated situation for people suffering from the usual ailments of a tropical climate; and the effect produced are most gratifying.

Penang heights of all others in the eastern seas, seem best adapted for a convalescent depôt, for which we have a cool and elevated situation; it is almost exempt from the severe squalls and sudden changes of temperature, found so deleterious to a weakened body. It is difficult to say what is the best month for a change to the heights, as the occurrence of the monsoons and their changes, are very irregular, and the rainy weather occurs on different seasons, at different months. These can always be guarded against by proper attention to clothing. The hot weather is of course the time when most hasten up the hill, with much benefit to themselves. The heights of China are utterly useless as Sanataria, in my opinion, as they are constantly liable to be enveloped in mist of a very cold damp character, very productive of bowel affections in even a healthy body. This we have scarcely any of at Penang; although the clouds in the morning envelope the heights, they speedily disappear as the sun rises. I should further recommend that, as a preservative from these mists, and any cold wind that may occur, a belt of trees, principally of the conifence, should be left in clearing the hill both above and below the Bungalows; the former for the sheltering of the station, and the latter to intercept any malaria rising from the thickly wooded valleys and under-wood for some distance to be cleared away. I believe Penang hill, if only the better elevations were chosen and those properly sheltered, would form a most advisable convalescent station for China Troops, and much better adapted than the Cape, on various accounts. One of the great causes of death in China, and on board ships proceeding to the Cape *en route* to England, is, I *know,* the long period that often elapses between the man being ordered home by the Doctors and the providing of ships by Government. If the destination of those poor fellows was Penang, numbers of ships could be obtained, and advantage taken of the

various steamers which touch these on their voyage to India. I also believe that many cases would be so recruited by the change as to be able to return to their duty in China, without the expenditure of time and expense entailed by a long voyage, and this principally in acute bowel and fever cases. Those who have their constitutions completely undermined by repeated attacks should go home at once. A scorbutic tendency is, I am persuaded, a common cause of bowel complaint, and of those very unhealthy ulcers that occur in the Straits and China. I believe the change from a lower to a higher elevation, and the change of diet, and the short sea voyage, admirably adapted for their removal.

From Captain W. F. MARRIOTT, Acting Secretary to Government, Bombay, Military, Department, to the Secretary to the Government of India, Military Department,—(No. 2489, dated Poona the 13th July 1860.)

I AM directed to acknowledge your letter dated the 16th of February last, No. 952B, and to transmit to you the accompanying copies of the papers specified in the margin, on the subject of Sanataria for the European Troops of this Presidency.

Letter from the Adjutant General, No. 2933, dated the 14th May 1860, accompanied by the two following.
Letter from the Director General, Medical Department, No. 891, dated 5th April 1860.
Report by the Quarter Master General of the Army, dated 2nd May 1860.
Resolution of Government on the above, No. 2188, dated 13th July 1860.

From Major T. STOCK, Acting Adjutant General of the Army, to the Secretary to the Government of Bombay, Military Department,—(No. 2933, dated Mahableshwur the 14th May 1860.)

Referring to the 4th paragraph of Government Resolution No. 1065, of the 14th March last, I have the honor, by desire of the Commander-in-Chief, to transmit to you the enclosed letter, No. 891, dated the 6th ultimo, being a very able report by the Director General, Medical Department, on Sanataria for European Troops in this Presidency; and with reference to this paper and its important subject, I am to communicate the observations of His Excellency, for the information of the Right Honorable the Governor in Council, as follows:

2. There are slight exceptions to the statement in the first paragraph, that the hill Sanataria in this Presidency are at present only

"Aboo" and "Poorundhur"; for there is a fair, although small, Sanatarium, sufficiently elevated to be above the range of the unhealthy hot wind, situated on the hill called Salabut Khan, near Ahmednuggur, which has been of great benefit to the sick Soldiers of that station.

3. The elevated fort also of Sattara, close to that town, has been used as a Sanatarium for sick Soldiers by the Medical Officer of the Troops of that station, with good results. According to his report Sir Hugh Rose strongly recommends the development and permanent establishment of this locality as a Sanatarium for the Troops at Sattara, or for the Soldiers falling sick on the line of march from Kolapoor and Poona through Sattara.

4. There is a substantial and spacious old building which made a good barrack for a Company of the late Jäger Corps, during the last year. The Officer who commanded it and the Medical Officer in charge, speak very favorably of the building as a barrack, which, in their opinion, only requires a few inprovements. There is good water on the hill on which the fort stands; the air there is cool and healthy, and it is close to the station of Sattara. Euteshwar, a little further off than the fort, offers also great advantages as a Sanatarium for Sattara.

5. The whole line of the Western or Syadree Ghauts or heights, running in a rough parallel with the sea, and at no great distance from it, from about Nassick southwards, and the spurs running in every direction from them, offer excellent sites for Sanataria.

6. Sir Hugh Rose earnestly recommends that a Sanatarium be constituted, without loss of time, on "Mount Aboo;" the present one, according to Dr. Rooke's report, being most unfortunately built "on the only spot on the hill that would prove unhealthy."

I. Nor does unhealthiness of site appear to be the only drawback of the present Sanatarium. By Dr. Rooke's account it appears to have been so flimsy and carelessly built, as to afford no protection against damp in the monsoon.

II. Mount Aboo's importance as a Sanatarium requires urgently that a proper and spacious building should be substituted for the present useless one, and afford a sanatory asylum for the numerous sick European Soldiers of the extensive northern division.

III. Nothing can be stronger than the terms in which Dr. Rooke represents the importance of a proper Sanatarium on Mount Aboo, in the 4th paragraph of his letter, to which the Commander-in-Chief begs to request particular attention.

7. The Quartermaster General, in his department, some time since submitted a plan and estimate for barracks on a new site at Mount Aboo; but for want of funds, it is understood, nothing has been done.

8. Generally speaking, the Bombay Presidency, except Sind and Neemuch, which have no hill Sanataria (unless Nusseer Khan could be persuaded to cede us a Sanatarium in Khelat, where the climate is admirable), may be said to be blessed with sea and hill Sanataria, although unfortunately several of them are but little known or used, as appears by an excellent report enclosed from Lieutenant-Colonel Phayre, Quartermaster General of the Army. Aware of the information which this energetic Officer possesses, and of the value of his opinion respecting Sanataria, Sir Hugh Rose enclosed to him Dr. Rooke's report, and requested him to address His Excellency a detailed report on the question of Sanataria, which moreover, is one of his competency. The report is very valuable, and proves how much remains to be done, and can be done in the way of providing good Military Sanataria in this Presidency, and thereby avert one of the greatest difficulties attendant on our possession of India,—the bad effects of its climate on British Soldiers.

Dated 2nd May 1860.

9. The Commander-in-Chief desires to name one more hill, "the Sapter Shing Hill," or, as the Natives call it, "Chuttur Sing," about 5 miles westward of Malligaum, which has never been used for a Military Sanatarium, although it appears to be qualified. It would be a very desirable one, because it is within reach of the large Military station of Mhow, which at present is too far from any Sanatarium.

The climate of the hill is little inferior to that of Mahableshwur; and on its top there is a plateau of considerable extent, which would accommodate, with great ease, from 500 to 700 men. The Quartermaster General has been requested to inquire whether there is a sufficiency of water on this site, and to ascertain also, whether there are any eligible sites for Sanataria near Neemuch, or in the Vindhya range, which might be useful for Mhow.

10. The Commander-in-Chief begs to request the special attention of the Government to the subject of this letter,—Military Sanataria. It is an all-important question in a military, political, and financial point of view.

11. As regards the military, they are so connected with the political consideration, that it would only create confusion and waste of time, in the opinion of His Excellency, to treat them separately. A military advantage is a political one in India; late events having proved that to our military power, more than to any other influences or causes, must we look for our possession of this country. Money is called the sinews of war; but the health of the Troops is a still more important requisite. Sir Hugh Rose feels convinced that, if the question of Military Sanataria in the Bombay Presidency were thoroughly gone into and considered, it would be found that the percentage of military sickness might be reduced to a proportion which would render the European Troops one-fourth, perhaps one-third more efficient than they actually are. For example, sometime after Her Majesty's 57th Regiment left Bombay, the Brigadier commanding at Ahmednuggur reported officially, that one-third of this fine Regiment was still suffering from the fever caught in Bombay. When Her Majesty's 28th Regiment of Foot embarked from Bombay against Beyt, they left considerably upwards of one hundred men in the hospital sick from the same illness.

12. Bombay is the most important military point in India; from its shores sailed the expedition which brought Persia to submission, and from thence may be directed one day operations in the direction of the Cape of Good Hope and other British Colonies, the shores of the Red Sea, Egypt, and the scenes of European policy.

13. Troops are conveyed by water-carriage from Bombay to the Punjaub and the North-West Provinces.

14. If India were to be attacked, Bombay, in all probability, would be the point.

15. In the presence of these facts and eventualities, Sir Hugh Rose entertains the opinion that it would be unnecessary for him to dilate on the importance of the health of the European portion of the Bombay Army; of their embarking complete and in health to undertake

operations abroad; or descending from their stations on the hills and plateaus to repel an intestine or foreign attack. It would be an advantage to the enemy if the health of these British Troops were in the same state as that of Her Majesty's 28th and 57th Regiments, when they left Bombay.

16. The whole line of ghaut and hilly ground should be occupied by British Troops or Military colonists.

17. We have the authority of the Duke of Wellington for saying that the people of India are remarkable for their knowledge and selection of good Military positions. Nothing then is more likely to maintain British prestige than the occupation of commanding ground by the British race.

18. Financially speaking, the present waste of health and life of British Soldiers is a serious loss. The cost of landing a Recruit in India is very great,—£100. Under the present system of placing Troops, in so many instances, in unhealthy and not in healthy stations which are at hand, this expense, great as it is, is incipient only on account of the unceasing relief of the sick or dead Soldiers by Recruits from England. The cost of sending back sick Officers and Soldiers to England is another serious item of expense.

19. The same great authority quoted above, rates an old Soldier at a remarkably greater value than a young one. Napoleon said that he considered Soldiers under 22 years' of age an embarrassment. The selection of healthy stations for Troops would preserve for the service old Soldiers.

20. In conclusion, Sir Hugh Rose would earnestly recommend that a Committee be appointed, consisting of the Quartermaster General and competent Medical Engineer, and Regimental Officers, to treat the great question which hitherto has not been sufficiently attended to; that is, healthy and commanding, instead of low and unhealthy stations for the British Troops.

21. Referring to the 3rd clause of the Government Resolution under acknowledgment, I am to forward the enclosed report on the hill of Kerowlie, in the Southern Muratha country, as a site for a Sanatarium.

From B. P. ROOKE, Esq., Director General, Medical Department, to the Adjutant General of the Army,—(No. 891, dated Bombay, the 5th April 1860.)

With reference to the 4th paragraph of Government Resolution, No. 1065, of 14th March 1860, in which I am desired to report to Government, through Army Head Quarters, what measures I would recommend "for testing the value of the new Sanataria, and the possibility of making greater use of those which are already partially and occasionally occupied," I have the honor to remark that the hill Sanataria in use in this Presidency, are at present only "*Aboo*" and "*Poorundhur.*"

2. European Troops will, I believe, eventually be located in the northern division, at Deesa and Ahmedabad only; those at present detached at Surat and Baroda are likely to be withdrawn before very long.

3. For the use of the European Troops in the northern division, no more perfect Sanatarium could be desired than "Aboo," if the barracks and hospital were erected in a healthy situation, and built of *pucca* materials. This Sanatarium is well adapted to the European constitution, and has the great advantage of being inhabitable during the rains, provided the barracks and hospital are constructed of materials affording sufficient protection from damp in the monsoon; but at present I regret that the great advantages of this excellent Sanatarium are wholly lost for want of proper buildings on the hill, those that now exist having been originally placed on probably the only spot on the hill that would prove unhealthy.

4. The utility of such a Sanatarium as "Aboo" to the Troops stationed in the fever-producing plains of Guzerat, is incalculable, and the saving of life and health to the European Troops would be such as to warrant the Government in going to considerable expense in rendering this Sanatarium available.

5. In the Poona division, the Troops to be considered are those at Poona, Ahmednuggur, and Sholapore.

6. The hill of *Poorundhur* has been found, after a fair trial, to be very suitable to Europeans, and sufficient for the sanatory wants of this division. The Sanatarium has been fully organized and is in

active operation, and nothing further appears to be required for the Deccan Troops.

7. In the southern division no hill Sanatarium as yet exists, and its want has not hitherto been felt. The station of Belgaum is said to be 2,500 feet above the level of the sea, and is very healthy. From the reports of the Medical Officers who have had charge of European Troops at Belgaum, the classes of disease to which the European Troops are there subject, point altogether to a Sanatarium on the sea coast as the most desirable. The great object in the Deccan is to avoid the hot winds that prevail in March, April, and May, but at Belgaum there are no hot winds of any strength; a fine, soft sea breeze blows at that season, reducing the climate to an agreeable temperature, and the rain also commences to fall much earlier than in the Deccan. A hill Sanatarium is thus scarcely needed for this favoured station.

8. A hill named "Kerowlie" in the Beedee district, has lately been mentioned as eligible for a Sanatarium for the southern division, and a Committee was appointed for its examination: it was found to be only about 600 feet above the cantonment of Belgaum, and it is very doubtful if its climate has any advantage over that station; whilst observations made at the same hours at Belgaum and Kerowlie, show no difference in the temperature. Its distance from Belgaum is less than forty miles, but the ascent is very difficult. One great objection to the Government entering upon much expense in making experiments at this hill is, that from the heavy monsoon and great prevalence of fogs, it could only be habitable for about five months in the year. There appears also to be some risk of the presence of fever arising from the thickly wooded ravines ascending the sides of the hill, from the jungly recesses of which malaria must be generated, and it will readily rise so short a height as 600 feet.

9. If it is decided, however, that a hill Sanatarium for this division should be established, I am convinced that some more elevated region than "*Kerowlie*," must be sought for.

10. The first step to be taken for the southern division, should be the establishment of a coast Sanatarium in the neighbourhood of Vingorla. One already exists in the *fort of "Rairee,"* where there are barracks and hospital, and further trial should *at once* be made of its

capabilities. Some little improvement might be necessary, especially in draining a piece of swampy ground in its immediate neighbourhood. The occupation of this fort by invalids from Belgaum would be attended with very trifling expense, and if due care was taken in selecting such cases only as were likely to benefit by a change to the coast, it would probably be found very useful in preserving the health of the Regiments at Belgaum.

11. The Troops stationed in Bombay have always the advantage of the great change afforded by easy removal by Train to *Khandalla, Poona,* and *Poorundhur*; and it is not probable that any nearer or more convenient localities could be found than those places. The hill of "*Hurrichund*" is doubtless nearer to Bombay than Poorundhur, but it is difficult of access, and the advantages of the rail overbalance those of propinguity.

12. In the Sind division there is no hill Sanatarium—there exists a chain of hills bordering Sind and reaching from the neighbourhood of Kurrachee to the northern extremity of the province, forming the western boundary of the valley of the Indus. Some of these reach as high as 6,000 feet above the sea, but they are out of the influence of the sea breeze, and formed of bare limestone rock deficient in water, and generally with a dry, parched atmosphere:—such as have been tried have been productive of severe malarious fever. I fear there is little hope of any suitable hill Sanatarium being found in this province. It has, however, the advantage of enjoying a beautiful coast; and a very serviceable Sanatarium has been established at "*Ghizree*" both for men and Officers.

13. The Malwa division is, as yet, without any Sanatarium for its European Troops, and it would be most desirable to discover some elevated land to which the invalid Soldier, debilitated by the fevers of Malwa, might resort; hitherto the only resource has been to send such men a long and wearisome journey from Mhow and Neemuch to Poorundhur, and from Nusseerabad to Aboo. This is the most pressing want connected with the subject of Sanataria in this Presidency, and one to which earnest attention should be given without loss of time; and I have directed the Superintending Surgeon to inquire and report on the subject. At present I have no knowledge of any hill of sufficient elevation in Malwa that would afford the necessary change of climate.

It is possible that in the Sautpoora range and the hill country between the Taptee and the Nurbudda, an eligible spot might be found.

14. In the neighbourhood, and within 14 miles of the station of Nusseerabad and close to Ajmere, is the hill of "*Taragurh*," which should be immediately tried by the Troops at Nusseerabad; and it is extraordinary that, with its known advantages over the climate of the plains, this should not have been done before. The ascent is very easy, but the space on the plateau is not large, but yet sufficient for 40 or 50 invalids. There is already an old building on the hill which at a small expense, might be made to accommodate 50 men.

15. Superintending Surgeon Ritchie visited "*Taragurh*" in January last, and reports that although somewhat confined, extensive walks could be made along the opposite ridge; that he found the air keen and bracing, and very different from the plain below; and that he formed a very favorable opinion of "*Taragurh*" as a local Sanatarium for Nusseerabad, in preference to sending invalids 150 miles to Aboo. I beg strongly to suggest that a trial should be made of this hill; and probably the saving of the expense attending the march of invalids to Aboo would pay the cost of a few doors and windows to the old Boomproof, and for removing stones and rubbish from its vicinity. The height of the hill is 2,800 feet above the sea, and about 1,000 above the plain. Water is collected in tanks, and is good and wholesome when filtered, and, if these failed, might be easily brought from below.

16. There are many diseases for which hill Sanataria are unsuitable, and particularly such as are generated in the high plains of the Deccan. I beg to recommend that coast Sanataria should be established at several points on the sea shore, a measure which would not entail any very great expense to the state.

17. For the Sind division, the Ghizree Sanatarium already exists, and is sufficient.

18. For the northern division an eligible spot might be found in the neighbourhood of Cambay, where a small Sanatarium might, with great advantage to the Guzerat Troops, be erected; but great care would here be called for in selecting the site. Since paragraph 18 was

perused, I have been favoured with the following from Major Crawford, Acting Deputy Assistant Adjutant General, Northern Division Army, whose long acquaintance with the sanatory wants of Guzerat makes his opinion regarding a coast Sanatarium for the northern division, very valuable.

"For the prompt change to a salubrious air that so often enables a sinking man to rally, we should have a coast Sanatarium for the benefit of the European Soldiers stationed at Ahmedabad and Baroda.

"When Kaira was occupied by Dragoons and Horse Artillery, such a Sanatarium was established at *Rawling*, about 5 miles from Cambay. The invalids sent there enjoyed to the full the sea breeze from the gulf, whilst their isolated position saved them from the temptation to excess that Cambay itself presented. '*Rawling*' would be open at all times of the year both for Ahmedabad and Baroda, and the expense of constructing the necessary buildings at Rawling would be comparatively little; but there is a spot on the shore, about 3 or 4 miles west of Cambay, that I think, offers a site for a Sanatarium better than that of *Rawling*."

19. A coast Sanatarium for the Troops in the Deccan and Malwa is very much needed; sick men requiring sea air are at present sent to Bombay, where the barracks at Fort George are the only ones available for invalids of the Indian Army. It is hardly necessary to show that a purer are, and a more open situation than those barracks offer, are required, in order that the full benefit of sea air may be enjoyed with any hope of its proving useful to the invalid.

20. There can be no want of appropriate situations on the coast of the Northern Concan, or even on the island, or in the immediate neighbourhood of Bombay; and I would beg to name *Bandora*, *Worlee*, or the hill of *Caranjah*, in the harbour of Bombay, which presents an elevation of 1000 feet, and is to all appearances well calculated for a Sanatarium.

21. In the southern division, the fort of "*Rairee*," already prepared for invalids, but unaccountably unused, is at hand,—at least for trial; but *Vingorla* affords very eligible spots for a Sanatarium, if *Rairee* should prove a failure.

22. In connection with Sanataria is also a question for the consideration of Government, whether, if it should become necessary to provide new barrack accommodation for the increased number of European Troops allotted to this Presidency, the barracks should not be erected on hills of moderate elevation, a residence on which would entail less expense to the European constitution than if the Regiments were stationed on the plains of India.

23. There are two spots which occur to me as remarkably adapted for this purpose, namely *"Panchgunny,"* 14 miles east of Mahableshwur, and *"Euteshwar"* near Sattara; on either of these hills Troops could remain the whole year. At Panchgunny the average fall of rain is only about 50 inches; the climate cool, clear, and bracing; abundance of water and supplies of all kinds; and ample room for exercise and drill. The altitude of Panchgunny is 4,000 feet, and that of Euteshwar 3,600 above the sea.

24. The climate of both is healthy and exhilarating; and although for invalids, Mahableshwur is said to be more agreeable than Panchgunny, from its containing more moisture in the air, yet this is doubtful, and is scarcely shown by the difference of the wet bulb, as registered at each place; and it is certain that, for maintaining the health of Eupeans in its normal state, Panchgunny is far preferable to Mahableshwur.

25. The hill of *"Euteshwar"* is, on its surface, a gentle slope, rising gradually from Sattara and continuing unbroken till it reaches Mahableshwur; it promises to form a very desirable location for European Troops. Rock, soil, scenery, and accessibility, are all propitious.

26. I would beg, however, to impress upon Government that, if the full benefit of hill Sanataria for invalids is to be obtained, something more than the mere erection of barracks is necessary, and that every means of recreation and amusement that can be adopted in this climate must be provided. Library and reading rooms, racket courts, skittle grounds, gardens, quoits, and swimming baths, and other minor amusements can be supplied at little cost to Government, but with infinite advantage to the state; or the result will probably be the same as followed the experiment made many years ago at Mahableshwur, viz. that the men, deprived of the society of their companions of the mess,

and of the amusements of camp, will become "hipped," listless, and depressed; and will probably return to the plain worse than they went.

27. In conclusion, I beg to state that, to carry out the wishes of the Supreme Government, the chief steps to be taken are ;—1*st*, to render "*Aboo*" available, by building barracks and hospital there on a well-selected spot, and of good material ;—2*nd*, to form small Sanataria on the sea coast at Cambay, Bombay, and Kairee ;—3*rd* to take steps to find a suitable hill within reach of Mhow, and to form a small Sanatarium on the hill of *Taraghur* as a resort for the sick men from Nusseerabad ;—4*th*, and above all, to supply each of the sanatory stations with the means of healthy exercise and amusement.

Report by the Quartermaster General of the Army on Sanataria for the Bombay Presidency, present and prospective.

Head Quarters, Mahableshwur, 2nd May 1860.

Our system for improving the health and condition of our European Soldiery by occasional change of air and scene, may be truly said to be in its infancy, inasmuch as, excepting one hill Sanatarium for about 130 men, at Poorundhur in the Deccan, and another at Mount Aboo in Guzerat, for 200 men, with a sea coast one for Sind at Ghizree near Kurrachee, we really have no properly established Sanataria, though there is no want of suitable sites for them, as will be shown in the course of this report.

2. I would therefore respectfully submit, for the Commander-in-Chief's consideration, a plan that will, as far as possible, secure to each Military station or circle of stations, its fixed sea coast as well as hill Sanatarium, to both of which Soldiers requiring either a soft and relaxing, or a dry and bracing climate, could be sent when necessary.

3. I have no doubt from what I have learnt of the Presidency during upwards of 21 years' service in it, that we shall with a little care and labour be able to fix upon eligible sites for both kinds; the main qualifications for the one seeming to me to be a healthy locality, with a pretty neighbourhood inviting exercise, which, combining with an elevated airy site for the barracks well exposed to the westerly breezes, will afford as pleasant a sea-side Sanatarium as could be expected in India; and I feel sure that along our western coast, be-

tween Kurrachee and the northernmost limits of the Goa territory, many such places could be found.

4. As regards hill stations, I would submit that the main desiderata are:—

1st.—A locality above the line of hot winds, which, in latitude 18° and 19°, may be generally estimated at an altitude of about 4,000 feet above the sea, though further south, in the westernmost Belgaum districts, the hot winds have very little strength at half that height.

2ndly.—A site, either on or connected with the western or Syadree range of ghauts, so as to catch the sea breeze before it loses its freshness by passing over the heated inland plains.

3rdly.—A place where the annual average fall of rain does not exceed 80 inches, though one of 50 or 60 would be preferable, if other advantages had not to be sacrificed to attain it.

5. On the last point hinges the possibility of a continued residence at the Sanatarium throughout the year, not that even places on the main Western Ghauts are unhealthy during the rains, as I can myself testify from having passed three or four monsoons with my family at the Phoonda Ghaut, when the fall of rain equals that of Mahableshwur (being estimated at an annual fall of nearly 300 inches); but that the incessant rain and gloomy weather, combined with the cessation of out-of-door exercise and employment, induce a depression of spirits that would be insupportable to a sick Soldier.

6. Our delightful hill station of Mahableshwur, and other equally high points of the Syadree range, such as Hurreechundurghur and others, though they would secure the two first qualifications, are, as a rule, uninhabitable by Europeans from about the 15th of June to the 15th or end of September, for the reasons just stated; and hence the necessity, which those who have considered this subject entertain, of selecting the spurs and slopes which branch off from the main range into the Deccan, at various points, as most likely to afford sites in every way adapted to our purpose.

7. Preparatory, however, to proposing a definite system of annual sanatory change, it may be useful to remark that the seasons during which that change is most necessary in this country, are between 1st March and 15th June, when, with a few exceptions (such as Belgaum and others which could be named) the plains generally are under the

influence of a scorching sun and as scorching a wind, which renders a resort either to the sea coast or to hill stations very desirable in a sanatory point of view. In some districts also, from the 1st October to about the 15th November annually, sultry heat and fever prevail to an extent that renders change of air for that period also very desirable for weak or sickly Soldiers.

8. The reason why annual change of air at the seasons just specified, has been so little recommended for Troops at out-stations is, that most of them, such as Mhow, Nusseerabad, Ahmedabad, Nuggur, Belgaum, and others, are too far removed from the present hill Sanataria, to admit of their being used by them. The difficulty experienced is not in the march to these stations, which could be easily enough managed in cool weather, during January and February, but it is the difficulty of returning to monsoon quarters again, before the heavy rains of July set in. This difficulty is a very serious one, owing to the exposure to heat and storms which it involves; it can only be obviated in two ways, viz. either by railway communication, or by multiplying our Sanataria.

9. I will now, therefore, proceed to submit proposals for both sea coast and hill Sanataria, being guided by the relative position of each station, or circle of stations, to known sanatory localities and the means of transit to and from them.

10. It will be seen from the accompanying map, that as regards what may be called our central stations, Bombay, Surat, Baroda, Ahmedabad, Poona, and Sholapore, are either already united by railway, or soon will be, and it is believed that ere long Nuggur and Sattara may be added to the list, whilst Mhow, Neemuch Nusseerabad, and Deesa, are isolated and likely to remain so for some time, except, perhaps Mhow, which will eventually be within 100 miles of the Bombay and Nagpore line of rail.

SEA COAST SANATARIA.
Bombay.
Poona.
Sholapore.
Nuggur.
Surat.
Baroda.
Ahmedabad.

11. For the stations, as per margin then, I would propose three sea coast Sanataria, the one at Colaba for 200 men, already proposed to Government (and which is a matter of necessity for the invalids, &c., who embarked annually for England at Bombay), the others at either Bandora or Bassein, and Domus, near Surat, with accommodation for 200 men in Bombay, and for 200 at Domus and at Bandora or Bassein, respectively, with Officers'

quarters, skittle alleys, racket courts, library, and canteen, we should have all that could be desired, I think. We might also add Deesa to the above marginal list, for, being only 94 miles from Ahmedabad, and connected with it by a good road, sick men or convalescents could, under an improved system of transport, be brought to the railway terminus at Ahmedabad, and proceed to either Domus or Bassein, as might be found practicable at the time.

12. I have mentioned Bassein, because it will soon be connected with Bombay by rail; and though I have not examined the place closely, yet from what I saw of it, and the beautiful country in its neighbourhood, it seemed to me to be well adapted for quartering a large body of Troops in, especially now that Bombay itself has become so over-populated and unadapted for Soldiers.

13. Domus would, I believe, be preferable to any place near Cambay for sanatory reasons; but as it will be close to the line of rail between Bombay and Ahmedabad, and is, moreover, accessible by sea within a few hours from Bombay, it seems to be the most desirable place we could fix upon, but as I have never visited it, I can merely repeat what I have learnt from others; and in proposing it, my only desire is to encourage inquiry and examination into its capabilities.

14. Bandora is a very good place, and connected with Bombay by rail also, and it too, should be examined.

15. As regards sea coast Sanataria for Nusseerabad, Neemuch, and Mhow, none that I can think of could be devised for them nearer than the ones under notice. Mhow especially will one day be quite within easy reach of them by the Nagpore rail; Neemuch and Nusseerabad would also be comparatively speaking, near, if the Bullock Train between them and Mhow is continued, and sick carts placed upon the line.

Nusseerabad to Neemuch is 144 miles; Neemuch to Mhow is 155 miles.

16. I should here mention, that at the close of last year and beginning of this, a considerable number of the 95th from Neemuch, and some men from Nusseerabad also, came down for change of air to the coast; and as we had no room for them in Bombay, they had to be sent to Khandalla, and eventually to Poorundhur, where they still are. On a future occasion, a similar detachment could travel by Bullock Train to Malligaum, whence (in

Nearly 100.

September next, I believe,) they would be able to travel by railway to Bombay, and thence to go by steamer to Domus, as the Bombay and Surat line of rail is not likely to be open soon, or they might go to Bandora or Bassein, if we establish a Sanatarium at either.

17. Thus, for every station of this Presidency, except Kurrachee, Belgaum, and Kolapore, I have shown how a change to the sea coast can be arranged annually, with little difficulty except for Nusseerabad and Neemuch, whose geographical position is such as would always render the movement of sick from them to the coast a measure of comparative labour.

18. Kurrachee has its own Sanatarium on the coast at Ghizree, five miles off, so nothing is required to be done for Sind.

19. For Belgaum and Kolapoor there is the fort of Rairee, which was tried as a Sanatarium in the year 1853 with success, the only argument urged against it by the Medical men at the time being the march back to Belgaum of some 80 miles in the sultry heat that precedes the rains. The fort contains ample and good accommodation for 87 men, which it would only require some 150 Rupees to put into thorough repair.

20. As regards hill Sanataria, I would respectfully refer His Excellency to the accompanying maps. No. 1 shows the whole Presidency, with the coast and hill Sanataria and the means of communication with them by lines of rail, either in existence or in course of construction. No. 2 shows a tract of country, the most prominent feature in which, as regards the subject under inquiry, is our hill station of Mahableshwur, on the main Syadree range, with two spurs branching from it, the one eastward to Panchgunny, and the other south-easterly to Sattara, or rather Euteshwar, a point on the spur about 1,300 feet immediately above Sattara, and resorted to at present as a Sanatarium by such of the residents of that station as cannot go so far as Mahableshwur.

21. It is to this spur, between the points named Dhardeo, Kass, and Euteshwar, on the sketch, that I would wish to draw attention as the tract best adapted for a grand central hill Sanatarium, where Europeans can reside throughout the whole year, owing to its general altitude above the line of hot winds, nearness to the main range,

Kass is, I believe, as high as Mahableshwur and other point of the Spur, not more than 300 feet below it.

and consequent freshness of its sea breezes, ample supply of water, capabilities in an agricultural point of view, and freedom from the incessant rain of Mahableshwur and the main range generally.

22. I might also allude to its importance in a strategical sense as commanding one of the main passes from the Deccan into the Concan, which, were it not for its sanatory capabilities, would be unimportant in connection with the present question; but, in conjunction with it is a point well worthy of notice, especially as the spur terminates at the fort of Sattara, one of our strongest and most important hill forts.

23. At Panchgunny, on the easternmost of the two spurs under notice, we already have a few European settlers who have bought up all the land of any value in the vicinity of that place, and are said to be prosperous in all respects; but in the hot season there is a scarcity of water I believe, and the place being on the *eastern* slope of the spur is warmer perhaps in April, May, and June, than is desirable for a Sanatarium. Its height is about 4,000 feet, much the same as the other spur, but being further east, not so cool and fresh in the hot weather.

24. The other, which I will call the Kass spur, is one that I would submit is far better adapted for sanatory purposes generally, than the Panchgunny one, provided we can ascertain that the annual fall of rain, at its most eligible points is not so excessive as to disqualify it as a residence for European Soldiers throughout the monsoon. Last year, in communication with the Collector of Sattara (Mr. Rose) I commenced a road which is eventually intended to connect Sattara with Mahableshwur by the easy and delightful route which the crest and sides of this spur alternately afford, contrasting strongly with the present road which, falling by a steep and dangerous line into the Yenna valley, not only deprives travellers during the hot season of the cool air which they might enjoy the whole way to Sattara on the top of the spur, but during stormy weather, and the monsoon, subjects them to detention from swollen streams—a casualty that cannot occur on the line I propose. I entertained hopes that during this season (April and May 1860) I should have been enabled to complete my survey of the spur, ascertain heights correctly, &c., &c.; but other duties have so completely occupied my time, that I have

20 miles.

The sum of Rs. 2,000, placed at my disposal by the Government of India for this survey and clearing, has been put under abeyance for the present.

been unable to do more than widen out the first part of the bridle path which I commenced last year.

25. What I propose, however, regarding it is that, connected as it will one day be by rail with the places as per margin, it is quite worth while for the Government to establish a main central Sanatarium for European Soldiers upon it, provided, as before observed, its qualifications for that purpose, in regard to the fall of rain, are as satisfactory as I can confidently assert all others are. The annual fall of rain at Euteshwar, above Sattara,—the south-east end of it—is only 48 inches; and the place is spoken of by Dr. Wiehe, long a resident at Sattara, in a recent report made by him to the Director General, Medical Department, as follows:—

Poona.
Nuggur.
Malligaum.
Sholapore.
Bombay.
Surat.
Baroda.
Ahmedabad.
Mhow (except 100 miles.)

"The hill of Euteshwar is very much superior to the fort as a locality for Europeans; one great drawback would be the want of water, although the hill abounds in springs of very good water. They are nearly all made to contribute to the supply of the town of Sattara by means of the aqueduct above referred to."

Letter from Director General to Quarter Master General, No. 2337, dated 19th September 1859.

"The elevation is about 1,300 feet above (Sattara) camp. It is nearly, though not quite, out of the influence of the hot winds. Flowers and vegetables grow to great perfection if properly supplied with water. The soil resembles that of the Mahableshwur hills. The fall of rain is about 48 inches, with frequent fogs in the month of May."

Sattara is 2,600 feet above the sea, so that Euteshwar is 3,900 feet, and Mahableshwur is generally 4,512 feet above the sea.

26. I would proceed to describe Kass, which is higher and better watered than Euteshwar, being at the source of the Oormooree river, further west also and close to the main range; but I trust that sufficient has been said to prove that my proposal, in regard to the Kass spur as a main Sanatarium for the bulk of the Bombay Army, deserves notice and inquiry into.

27. The only stations, then remaining to be provided with hill Sanataria are,

Nusseerabad, where the neighbouring hill of Taraghur is now under trial, as ordered by His Excellency Sir Hugh Rose very recently.

For *Neemuch* we have no Sanatarium as yet. It is 206 miles from mount Aboo, with a bad cross country track between, and 155 miles from Mhow, which is 96 distant from Asseerghur, the nearest point where the Nagpore rail passes. Inquiry as to a Sanatarium for Neemuch in its neighbourhood is very desirable.

Deesa has mount Aboo close by, where barracks are about to be erected.

Mhow has no Sanatarium, and if one cannot be found in the Vindhya range, near Bhopawur, it will be necessary to bring the sick by Bullock Train to Asseerghur, and thence by railway to the central Sanatarium.

Punalla, estimated at 1,200 feet above Kolapoor.

Kolapoor has as good a hill Sanatarium in Punalla, about 14 miles distant from it, as could be desired; and barracks for 30 men should be erected there as soon as possible.

Belgaum climate is naturally so good, and the hot winds of so little strength, that it is questionable whether any other change for the sick of this station than that which the sea coast Sanatarium of Rairee fort would afford is desirable. Should it be so, however, the *Ram Ghaut* would, I think, be the best place to send sick Soldiers to, it being on the main range of ghauts, and a very healthy place, resorted to, in fact, by Officers and their families during April and May every year.

Pownghur, about 34 miles from Baroda, has been mentioned as a good hill Sanatarium, but access to it would be more difficult perhaps, and more expensive for the Baroda garrison than by rail to the central Sanatarium. It might be tried, however, as a temporary measure, pending the opening of the rail between Surat and Bombay.

This hill has not been surveyed yet, and it must be so, and these points correctly ascertained.

Sulabat Khan's Tomb, near Nuggur, said to be above the influence of hot winds, is another useful Sanatarium for local purposes, having been recently used as such, and until the rail connecting Nuggur with Poona and Sattara by Patus (which I have been informed is the projected line, though I cannot say it with

certainty,) is open, it will afford a pleasant retreat for sick men during the hot season. Its distance from Nuggur is only six miles.

28. The only station to be noticed now is Kurrachee, which, as before stated, has a very good sea coast Sanatarium at Ghizree. As regards a hill Sanatarium, however, for Sind, all efforts to obtain a suitable one, easy of access aud within proper limits, have as yet failed. I last year saw, I think, a notice of one in the hills near Sehwan, and probably when the rail is open it may be used; but sites upon the limestone hills of Sind have to be selected with great care, as we learned in 1844-45, when Sir Charles Napier, in a desire to provide a Sanatarium for Kurrachee and Hyderabad, directed a certain number of Troops to be moved to a place called Guibee, in the hills between Kurrachee and Kotree, the result of which experiment was, that the whole Force, including the General, got fever and had to be withdrawn.

At Kelat, about 300 miles north of Kurrachee, is an English climate, but for political reasons, irrespective of others, connected with badness of roads, &c., it could not be used by us, I fear.

29. With steamers constantly plying between Kurrachee and Bombay, any bad cases requiring hill air might be sent to Poorundhur or the central Sanatarium before spoken of, should it be thought advisable to establish it.

30. There is a hill at Aden sometimes used as a Sanatarium, but access to it is so difficult that it has fallen into disuse, I believe. A report, however, regarding it can be called for.

No. 2488 of 1860.

Military Department, *Poona*, 13*th July* 1860.

Letter from the Adjutant General, No. 2933, dated the 14th May 1860, on Sanataria for the European Troops of the Bombay Presidency.

Resolution of Government on the above.

All concur in representing the need both of coast and hill Sanataria.

2. In the Sind division, the establishment at Ghizree appears to be perfectly suitable as a coast Sanatarium, and no suitable hill Sanatarium has as yet been discovered. The climate of Kurrachee is a favourable one.

3. In the Malwa and Rajpootana division there are no Sanataria. Bombay affords the most accessible coast Sanatarium. Dr. Rooke recommends an experiment of the old Fort of Ajmere, called 'Taraghur,' for the Troops at Nusseerabad. This should be tried. The Governor in Council is prepared to sanction a moderate expenditure for that purpose.

4. Inquiries appear to have been instituted regarding any suitable hill station near Mhow. The result of these inquiries must be awaited. The climate both at Mhow and Neemuch is favorable to Europeans.

5. For the Northern Division, every one concurs in recommending Mount Aboo as a perfectly suitable hill Sanatarium, if only the buildings be improved. Government has sometime since called for plans, and all that can be done at present is to hasten their preparation.

6. For a coast Sanatarium for the Northern Division, Dr. Rooke suggests the neighbourhood of Cambay; the Quartermaster General suggests Domus. His Excellency the Commander-in-Chief is requested to make such inquiries regarding the relative advantages of these places as may seem necessary. The Governor in Council is prepared to recommend to the Government of India the necessary establishment at either one or the other. It is worth consideration whether the establishment of a Sanatarium at Domus could not be made the means of dispensing with the European detachment at Surat.

7. For the Poona division, Bombay affords a coast Sanatarium; and inquiry has been instituted for a place on the coast near Bombay, free from the objections which attach to the immediate neighbourhood of a large city. Dr. Rooke considers the existing hill Sanatarium at Poorundhur to be sufficient for this division. There is moreover, a small establishment at Salabut Khan's Tomb for the Troops at Ahmednuggur.

8. For the Belgaum Brigade a hill Sanatarium is considered unnecessary, the climate of Belgaum itself being so nearly that of the hill stations. For the purposes of a coast Sanatarium, Dr. Rooke recommends that the Fort of Rairee be tried immediately. Barracks and a hospital already exist; and Dr. Rooke represents that the experiment would be attended by trifling expense. The Governor in Council desires that the experiment be made accordingly. Orders should be

given in the Public Works Department for the drainage of the piece of swampy ground in the neighbourhood of the fort mentioned by Dr. Rooke.

9. The Governor in Council is also prepared to sanction a moderate expenditure, in furtherance of Dr. Rooke's concluding recommendation that each of the Sanataria should be supplied with the means of healthy exercise and amusement.

10. The foregoing disposes of all points which admit of immediate and complete decision. The Quartermaster General, however, proposes a large central hill Sanatarium at Euteshwar, or at some place on the spur which extends from Mahableshwur to Euteshwar near Sattara, in supersession of all other hill Sanataria south of the Vindhya range; and Sir Hugh Rose recommended "that a Committee be appointed consisting of the Quartermaster General and competent Medical Engineer, and Regimental Officers, to treat the great question which hitherto has not been sufficiently attended to, that is, healthy and commanding instead of low and unhealthy stations for the British Troops."

11. If the political considerations which determine the stations of our British Troops be regarded, it is not obvious how such a Committee could be competent to propose any considerable change; there are no more healthy stations known in Sind, Rajpootana, and Malwa, which could be substituted for the existing stations. Mount Aboo can accommodate only a very small number of men. Belgaum is a remarkably good climate. It cannot be proposed to remove the Troops from Poonah. The Governor in Council does not perceive that any considerable change of the principal stations is practicable.

12. The proposal for a central Sanatarium at Euteshwar or Panchgunny, the Governor in Council regards favourably, and would be glad to be favoured with whatever statistical information respecting temperature, rain-fall, water-supply, &c., may have been collected. To make full use of such a Sanatarium it would be desirable not merely to collect invalids from various Corps there, but to occupy it by integral portions of the Deccan Force. It is worth consideration whether the withdrawal of a portion of the Poona Force to Euteshwar might not facilitate the removal of the Ahmednuggur Force to Poona. The removal of the Head Quarters of the Artillery to Poona has been repeatedly recom-

mended; and if the large Arsenal were removed there appears to be no longer any sufficient reason for maintaining a strong European Force at Ahmednuggur.

13. A reply, in accordance with this resolution, will now be sent to the letter from the Government of India, No. 952B, of 16th February last.

(Signed) W. F. MARRIOTT, *Capt.*,
Actg. Secy. to Govt.

From Lieutenant Colonel A. P. PHAYRE, Commissioner of Pegu and Agent to the Governor General, to Major General R. J. H. BIRCH, C. B., Secretary to the Government of India, Military Department, Fort William,—(No. 22, dated Rangoon, the 30th June 1860.

I have the honor to acknowledge the receipt of your letter No. 952F, from Major Atkinson, Officiating Secretary to the Government of India, on the subject of sanatory establishments for European Troops, especially in the provinces round the Bay of Bengal.

2. On this important subject I have consulted those Officers in the province, who were most likely to supply information on the subject. I now beg to submit copies of the following letters:—

From Dr. Graham, the Deputy Inspector General of Hospitals No. 71, dated 16th April 1860.

From Dr. D. Brandis, Superintendent of Forests, dated 4th June 1860.

3. There are two distinct localites suitable for Sanataria in Pegu, first the sea shore, and second the mountain ranges.

4. Dr. Graham treats of the first description of Sanataria. There are two such places in Pegu, or close adjoining, which are or might be made suitable for the resort of Europeans, for whom a change of air might be recommended. One is at a place called Elephant Point, at the mouth of the Rangoon river. The other is at Amherst, at the mouth of the Salween or Moulmein river.

Elephant Point has been occasionally resorted to by persons from Rangoon desirous of a change of air; but that has been chiefly during the months from February to April inclusive. No formal investigation has been made of the suitableness of Elephant Point for a Sanatarium for European Troops; but as it would scarcely be advisable in any case to establish two Sanataria so close together, as are Elephant Point and Amherst, and as the latter place has already been occupied and reported on, it may be proper to refer to it first.

5. Dr. Graham states that a Committee assembled by order of the Most Noble the Marquis of Dalhousie—this was in 1853—pronounced an opinion not altogether favorable upon Amherst as a Sanatarium. It will also be seen on reference to letter, No. 89, dated 7th January 1854, from Major Banks, Deputy Secretary to the Government of India, that "the Superintending Surgeon advocated the establishment of a depôt for sick Soldiers at Rangoon, and the abandonment of the depôt at Amherst." As, however, Elephant Point has never been fairly tried, I should beg to recommend that that place be visited by a Committee, especially in the rainy season; and I should recommend also, that the suitableness or otherwise of Amherst as a Sanatarium be again investigated and reported upon.

6. The above two places are the most likely of any I know in this vicinity to prove suitable, because they are on the sea shore, and are readily reached from the towns of Moulmein and Rangoon by boat. Amherst has the great advantage in its favor of a resident native population, from whom many articles of comfort, as vegetables, fish, and so on, could be procured. This is not the case, at least not to the same extent, at Elephant Point; so that Amherst possesses advantages in that respect not likely to be enjoyed at Elephant Point. It has been mentioned that the sick men formerly stationed at Amherst, found their spirits much depressed from the loneliness of the place, and the want of amusement. I feel confident that these defects might be remedied by providing the men with the means of having recourse to games and athletic amusements, and by making paths in the vicinity, passable during the rains.

7. With regard to mountain Sanataria, there are three mountain regions in Pegu.

1st.—The Arracan range on the west.

2nd.—The Yoma or central range, lying between the rivers Irrawaddy and Sitang, and

3rd.—The hills east of the Sitang in the district of Toungoo and its vicinity.

8. With regard to the Arracan range of hills, I have visited them at several points. I consider that they no where have sufficient elevation to afford a bracing climate, while their dampness during the rainy season is excessive. They extend north and south from about 16° to 19° 29′ north latitude, within the British territory. Their extreme elevation within the above limit does not exceed 3,500 feet. The fall of rain at most parts of these hills, would not be less than 200 inches a year; and at some periods of the year the climate is very unhealthy, that is, persons going into them, are liable to jungle fever, No part of these hills, therefore, is suited for a Sanatarium.

9. Dr. Brandis in his report treats of the central or Yoma range, and of the hills east of the Sitang.

The first evidently is not sufficiently elevated to give a good Sanatarium.

10. East of the Sitang, and about the latitude of 19° north, Dr. Brandis describes a mountain region which would probably afford a suitable Sanatarium at an elevation of about 5000 feet. This would be four or five days' journey south-east from the station of Toungoo. But Toungoo itself is so difficult of access, that the Sanatarium in that vicinity could only be of use for the men of the Regiment at Toungoo itself.

11. It appears, however desirable, that the climate should be tested during the rainy season by an Officer competent to decide thereon. The fall of rain at Toungoo is from 80 to 90 inches, and the fall on the hills would probably be more.

12. The very difficulty of reaching and leaving Toungoo during the greater portion of each year, seems to point to the advisability of seeking out a place in the vicinity, where sick men might be sent to recruit their health. A road, some 50 to 60 inches long, would have to be constructed to reach the place.

12. The other spot referred to by Dr. Brandis, is a hill to the south-east of Moulmein, and distant from that place about 150 miles.

That place is situated in the Tenasserim Provinces, and I beg to refer to Dr. Brandis's report for full particulars.

From Dr. H. GRAHAM, Superintending Surgeon, Pegu Division, to Colonel PHAYRE, Commissioner of Pegu and Agent to the Governor General,—(No. 71, dated Rangoon, the 16th April 1860.)

I HAVE the honor to reply to your letter, No. 217, Military, on the subject of Sanataria in this province or parts adjoining.

2. Firstly, as regards Amherst, it cannot be said this island has been tried to any extent as a Sanatarium. Some years ago, it was the custom to send there, occasionally, during the hot season, sick soldiers from Moulmein; and a report of the benefit they derived, led the Madras Government to seek authority to spend some little money in testing further the value of Amherst as a Sanatarium, but the Supreme Government refused its sanction. During the late war, many sick and wounded were sent there, but with little selection as to cases, and no satisfactory results.

3. The opinions of the Committee assembled, subsequently by Lord Dalhousie's order, were somewhat conflicting; but the grounds on which Amherst was rejected as a Sanatarium, and which had the full assent of my predecessor, now Director General of the Medical Department in Bengal, were its unfitness during the heavy and protracted monsoon, and its somewhat questionable salubrity as regards fever for some months after the cessation of the rains; thus, leaving only from four to five months, when a resort to Amherst could be deemed desirable. A further objection is recorded, as strongly felt by the Soldiers, namely the excessive and depressing stillness of the place.

4. These objections appear to me conclusive against making Amherst a Sanatarium for Burmah. Neither should I expect any compensating advantage from establishing one at Elephant Point.

5. During the months indicated, residence at Amherst might benefit cases of fever, or of diseases dependant thereupon, contracted in Bengal. But malarious fever is comparatively rare among Europeans in Burmah. Our maladies, when rendering change necessary, usually require that the patient be sent to some bracing climate.

6. For this reason I should not expect, as regards this province, any marked benefit from establishing a Sanatarium on the Cheduba island. But I have no personal knowledge of that spot; and if considered desirable, shall be happy to make such an examination of it, as may enable me to report more definitively.

7. I may observe in conclusion, that under the term "Sanataria," are included places only useful to promote recovery from disease or convalescence, and places, residence in which, may preserve to the Soldier his pristine strength and vigour in a larger degree than he can retain them elsewhere in India. Such places are by no means the same; the latter I apprehend are only found on elevations sufficient to render the average temperature thereof not less than twelve degrees lower than that of the plains beneath. Such sites to a certain extent, and with exceptions, will also meet the end of promoting recovery. But other residences, which may be found useful in promoting recovery, may, and I believe very generally will, be found without advantage, except very indirectly and slightly, in preserving to the Soldier his strength and vigour.

This feature I take to be characteristic of all places, whose title to be considered sanatory rests, or mainly so, on nearness to the sea.

From Dr. D. Brandis, Superintendent of Forests, Pegu, Tenasserim, and Martaban Provinces, to Colonel A. P. Phayre, Commissioner of Pegu and Agent to the Governor General,—(dated Camp Yonatheyat, Thanawaddi District, the 4th June 1860.)

I have the honor to acknowledge letter, No. 22, dated 31st March 1860, with copy of letter, No. 952F, dated the 16th February 1860, from the Secretary to the Government of India, Military Department, requesting me to give my opinion as to whether I consider there are any elevated positions on the hills between the Irrawaddy and Sitang rivers, and those east of the Sitang, which appear suitable for the establishment of Sanataria for Europeans.

No locality suitable on the hills between the Sitang and Irrawady rivers.

2. In reply I beg to observe that I do not think any locality on the hills between the Irrawaddy and Sitang rivers, is sufficiently elevated to justify the establishment of a Sanatarium. The highest point in the Pegu Yomah that I know, is the *Kawbaloo* town, nearly in the lati-

tude of Akouk town, on the Irrawaddy now, and a few miles north of the sources of the Bamagee or Pegu river. I have not ascended the hill myself, but estimated its height by comparison with others in its immediate vicinity, as not exceeding 3,000 feet. The main elevation of the extensive, but very uneven plateau, from which the Pegu river takes its rise, is about 2,000 feet.

Mountain ranges east of the Sitang river.

3. East of the Sitang river, two mountain ranges may be distinguished, being two slightly diverging branches of the great mountain Stock, between the Salween and Sitang rivers south-east of Toungoo. The western range which may be called the Martaban range, commences south-east of Toungoo, in the corner between the Myitguan and Thoukyeghat rivers, and stretching in a south-south-easterly direction towards Moulmein, is interrupted by the Salween river, but after a short break it re-appears as the Tenasserim coast range.

The eastern range may fitly be called the Salween range; it is separated from the former by a remarkable longitudinal cleft, through which two rivers run in opposite directions, having their sources near each other, and divided by a low ridge only. The Myitguan, a tributary of the Thoukyeghat to the north-west, and the west branch of the Yoouzaleen or Praello (Kaven) to the south-east. Further south in the latitude of Kyou Kee, south of Kolodo, the Salween range suddenly narrows, assuming the character of a long narrow spur, running with great regularity for about 72 miles in a south-south-east direction, with an average elevation of 3,000 feet. It terminates near the Rjodau or Salween rope station, throwing out its last out-runners to the mouth of the Yoouzaleen river, which stream it separates throughout its course from the Salween, and for a distance of about 30 miles from another tributary of the latter, the Maytharouk river. This remarkable ridge is considered, even by the Kareens, as one range only, and called by them the *Bithoko* throughout its extreme length: all other mountain ranges being generally called by a multiplicity of names, according to villages, rivers, trees, or other remarkable objects near them.

The Salween range does not altogether cease here, however, for it re-appears on the east side of that river in the corner between it and the Thomqeen, and runs along the Thomqeen to near its sources.

In the mass of mountains here described, east of the Sitang river, there are two localities known at present which may prove suitable for Sanataria—there may be many others, but they have still to be discovered—one is in Pegu, the other is in the Tenasserim Provinces.

Locality proposed for a Sanatarium south-east of Toungoo.

4. The first is on the mountain Stock, south-east of Toungoo, from which the two branches mentioned above proceed. The point I would recommend is on the mountain's forming the water shed between the sources of the Kyay Choung to the west, the Layllo (Kareen) on Eastern Yoon Taleen to the south, and the Kaymapyoo, Pah Choung, and a tributary of the Pongloung or Kareenee Choung to the east and north. It is an extended tract of mountains, covering about 100 square miles, and with an average elevation of 4,000 feet, but with numerous spurs of a much greater elevation. These mountains must not be confounded with the outer ranges, for instance that on which the village of Bogeley is situated. The latter village situated near the upper limit of teak trees, at an elevation of nearly 3,000 feet, has a very pleasant climate during the dry season, but is not sufficiently elevated to warrant the establishment of a Sanatarium on its site.

How to be made accessible from Toungoo.

5. To render the central region of mountains accessible, a road would have to be made from Toungoo to the mouth of the Kyay Choung into the Thoukyeghat, now, and thence to the height of the water shed between the Salween and Sitang rivers, east of the present site of the Kareen village of Onbo. This point, which would be the first stage on the hills, is called Mammalo by the Kareens of that locality, has an elevation of 5,200 feet, and is covered with grass-jungle on deserted hill clearings or Toungyas, with patches of pine forest (*Pinus Khasyana Royle*) and dense evergreen forest (*Quercas ferrestrata, Roxb. Castanea ferox, Wall. C. Argyrophylla, Wall. Helicia excelsa*) and others.

19th May 1860, 2-45 P. M. Boiling point 202° 8' Temp. 73° 5'

As the crow flies, it is about 36 miles distant from Toungoo, and almost due east of that place. By the road here proposed, it may be reached in three marches; the two first leading our undulating ground to the banks of the Kyay Choung at an elevation of about 1,200 feet; the third march being occupied in the ascent.

But the Mammalo Pass is not a place suited for the establishment of a Sanatarium; it is a narrow ridge with a steep descent on either side, and it is not sufficiently elevated for a latitude of 19°. It will be necessary to proceed ten miles further south, where there are several elevated mountains, which, to judge from the angle of elevation and the apparent distance, rise from two to three thousand feet above the height of the Pass, and may offer sufficient space for the establishment of a station.

The highest locality visited by me was on the Taepo range about 25 miles, as the crow flies, south-west from the Mammalo Pass, and at an elevation of 5,800 feet. But this is on one of the outer ranges, and less easy of access from Toungoo.

14th February 1860, at noon. Boiling point 201° 6 Temp. 67°.

If a suitable locality south of the Mammalo Pass can be found, it may be reached from Toungoo in four days, provided some expenditure is incurred to make the road even, and to clear away the jungle. The throwing up of embankments would not be necessary, except in a few localities, as the line leads for the greater part over high ground; but a bridge over the Thoukyeghat, and one or two over the Kyay Choung, as well as several smaller bridges would have to be constructed, and the sides of banks or slopes would in many instances have to be cut. In the rains, large boats ascend far up the Thoukyeghat river, so that nearly one-half of the distance may be accomplished by water.

How to be made accessible from Shoaygeen.

6. The locality here described may also be made accessible from Shoaygeen, but the distance is greater, and the road offers more difficulties. Boats go up as far as Kyon Kee, and from Kyon Kee the bullock road from the Shan country would have to be used as far as the head waters of the Payllo Choung, whence a path would have to be opened to gain the central mountain range to the north.

Climate.

But the climate is naturally cooler than in the plains about, even on the Yoongaleen plateau, situated south of the mountain Stock, here described, between Kolodo and Kyon Kee, with an average elevation of 3,000 feet, (Lomatee* on the Yoongaleen river 2,600 feet. Hottulo Sukun † 3,200 feet.) Frost is said to occur every morning during the months of December and January.

* Mean of four observations.

† Mean of three observations

7. My observations of the temperature on these mountains were made during February and May 1859; the former when coming from Toungoo to the Salween teak forests; the latter when returning from Salween to Toungoo.

In February I found the daily minimum about sunrise to vary from 42° to 69,° at elevations between 2,600 and 3,500 feet; and the daily maximum in the same localities from 79° 5', to 81° 3'. In May the minimum ranged from 66° to 71°, and the maximum from 74° to 76°. In February the sky was perfectly clear—in May it rained almost incessantly.

The Kareens say, that the rains are much heavier on the mountains than in the plains, and this circumstance if correct, may prove rather a drawback for the establishment of a Sanatarium. This part has not yet been explored, and is likely to offer considerable difficulties. The distance of the place proposed from Kyon Kee, I estimate at about 15 miles in a straight line. Kyon Kee itself is about 10 miles distant from Shoaygeen.

8. The rocks observed on the mountains here described are, granite, gneiss, and quarzite. Limestone is only found lower down, in the valleys of the Salween, Sitang, Yoonzaleen, and their tributaries. The tin washings near the head waters of the Kaymapyoo Choung are situated at an elevation of 3,100 feet, and at a distance of about 8 miles (as the crow flies) east of the locality indicated above.

16th May 1859, 8-30 A. M. Boiling point 206° 5' Temp. 71° 5'

9. The circumstance that these hills are inhabited by Kareens, a considerable proportion of whom have become christians, would facilitate the establishment of a Sanatarium here. On my journey across these hills from the Kaymapyoo Choung to Toungoo in May 1859, I visited or saw six villages, all christian Kareens, situated at an elevation between 3,500 feet and 4,500 feet—none being located higher; and from the information received, I am induced to believe that there were about nine more villages round this central mountain Stock: these however were said to be healthier, and in a wild state. Some of these villages contain from one to two hundred inhabitants, others consist of one large shed only, with two or three families.

Inhabitants.

The second locality alluded to above, as likely to be suitable for the establishment of a Sanatarium, is the region in the neighbourhood of the Moolejit, an isolated peak, ascertained by Major Trikell to be 7,171 feet high. It is situated south-east of Moulmein, between the Houndrow and Thoungyeen rivers, and at a distance from Moulmein of only 150 miles, of which one-third can at all seasons be made by water.

These mountains are the continuation of the Salween range mentioned above: a portion is usually called the Donat range; and although no wide extent of mountain land similar to that south-east of Toungoo has as yet been discovered here, yet the main elevation of the range does not appear to be lower.

Further notes regarding the configuration of these mountains, as well as regarding their vegetation and climate, are contained in a memorandum on localities suitable for Cinchora cultivation and Sanatarium in these provinces, written by me in January last at Calcutta, at the request of the Secretary to the Government of India for Foreign affairs. It was intended, I believe, to print this memorandum in the selections from the records of the Government of India.

From Lieutenant Colonel A. FYTCHE, Commissioner, Tenasserim & Martaban Provinces, to Major F. D. ATKINSON, Deputy Secretary to the Government of India, Military Department, Fort William,—(No. 61, dated Moulmein, the 20th March 1861.)

WITH reference to your circular letter, No. 886, of date 19th February ultimo, to my address, I have now the honor to report as follows, on the establishment of a Military Sanatarium in these provinces, and the making of which report appears, through inadvertence on the part of my predecessor, to have been overlooked.

2. The only site which is easily accessible, and possesses the necessary recommendations for a Sanatarium in these provinces is Amherst Point, situated at the mouth of the Salween or Moulmein river. It possesses a high and dry surface of a lateritic formation, a purity of atmosphere which is maintained throughout the year by the healthful sea breeze, and a temperature rendered more equable by the same agency, than at any other points distant from the coast: the

station of Amherst especially, in the absence of all miasmatic influences, appears to possess many of the essentials as a place of resort for the restoration of health, when no organic depreciation of the system exists, requiring a lower range of temperature than it possesses.

3. During the late war with Burmah, a depôt for sick Europeans of the Force was formed at Amherst, on a limited scale, but as no records appear to have been kept (at least if they were, no statistics on the subject are available here for reference) the result cannot be shewn;—but it is the opinion of the Civil Surgeon of Moulmein, that with a sufficient staff, and superintendence, the locality is admirably adapted for sanatory purposes, in many of the ordinary diseases of India. The mean range of temperature for the year is 78°. The extremes of ditto 56° and 86°, and the fall of rain 142 inches.

4. The site amongst other favourable circumstances also possesses the advantage of beautiful scenery, and the means of obtaining occupation and amusement by boating, sea bathing, hunting game with dogs, or shooting; and vessels are constantly passing the point, which is always a pleasant sight to a European eye in this country.

5. There are other sites on the different hill ranges in these provinces, ranging in altitude from 3 to 7000 feet, but their inaccessibility through the want of roads, and their distance and heavy jungle, that has to be traversed before they could be reached, precludes their being used under existing circumstances as Sanataria.

From Major E. K. Elliott, Commissioner of Nagpore, to Major General Sir R. J. H. Birch, K. C. B., Secretary to the Government of India, Military Department, Fort William,—(No. 58, dated Nagpore, the 11th August 1860.)

Papers and correspondence regarding Muhtoor in the Chindwara District, proposed as a Military Sanatarium, distant from Chindwara 36 miles, and reported to be 3,500 feet above the level of the sea, (*vide* Chief Engineer's report.)

With reference to the letter from your Office, No. 80C, under date the 3rd of April last, transmitting a communication, No. 952A, addressed to the Secretary to the Government of Fort St. George, in the Military Department, on the 16th of February, regarding certain Sanataria and requesting that aid might be afforded in the prosecution of any enquiries that might be instituted on the subject within this province, I have now the honor to transmit, for the consideration and orders of

His Excellency the Governor General of India in Council, copies of the correspondence and documents as noted in the annexed list, and which will be found to contain the fullest information regarding the locality proposed as a Military Sanatarium.

2. This locality has been visited by a Committee composed of the Officers named on the margin, whose report drawn up in great detail, will be found amongst the enclosures accompanying this letter.

PRESIDENT
Major J. L. Patterson, Her Majesty's 91st Regiment.
MEMBERS
Captain E. F. Burton, Assistant Quarter Master General, N. Force.
Captain E. Saunders, Executive Engineer, N. Province.
Assistant Surgeon R. Watson, Her Majesty's 91st Regiment.
J. T. Maule, Esq., Deputy Inspector General of Hospitals, in attendance, for the purpose of aiding the Committee with his advice and suggestions.

3. The report is, on the whole, very promising, and sufficient has, in my opinion, been recorded in favor of Muhtoor, to render it in every way most desirable that the place should be allowed a fair trial. The advantages of a Military Sanatarium in this part of India are so obvious, and the benefits to European Soldiers and their families would be so priceless, that I do not hesitate to press the matter upon the early attention of the Government. The interests at stake are so great, and a successful result is of much moment, that it seems to me, in the highest degree essential, not only that an experiment of Muhtoor's capabilities as a convalescent depôt should be tested, as soon as may be practicable, but that on outlay should be authorized sufficiently large to admit of the climate of Muhtoor and its fitness for the intended purpose having a fair trial. I quite concur in the views entertained by Brigadier Browne, and in the event of Government sanctioning the establishment of a depôt next hot season, as an experiment, I would recommend the plan proposed by the Brigadier, that the requisite buildings should be constructed of a character sufficiently permanent to admit of their being added to, rather than pulled down and rebuilt in the event of the experiment proving successful.

4. The barracks to be erected, however limited in extent, should be as far as possible, similar (in point of withstanding the influence of climate &c.,) to permanent barracks; temporary sheds, or huts of mere wattle and dab, and otherwise, but imperfectly suited for the shelter of sick Europeans, could scarcely be expected to afford such a result as might be looked for, were the accommodation to be provided of a more permanent nature

and constructed of materials better calculated to protect the inmates from bad weather.

5. The Chief Engineer of the province, Colonel A. H. E. Boileau, in accordance with the late Commissioner's sanction, visited Muhtoor in October 1858. His report on the locality will be found amongst the papers forwarded. It has been prepared with great care, and it contains much valuable information. The map which accompanies it shows, very practically, how eligibly Muhtoor is situated for the purpose of a Military Sanatarium. It is the centre of no less than 14 different stations, none of them at a greater distance than 120 miles, and all readily accessible. If the experiment succeeds, great indeed will be the saving in health and money. The gain to the state will be incalculable. Attached to Colonel Boileau's report is the plan of a convalescent barrack, calculated to accommodate 16 men, and estimated to cost Rupees 8166. At least one barrack of this description, or even two, with other requisite buildings, might be sanctioned, with a small sum for roads, and improving the approaches.

6. Early orders on the subject are solicited, as operations should be commenced upon as soon as the season will admit, if a party of any strength is to be accommodated before the next hot weather begins. Timely authority will be necessary for the collection of building materials and labor, and much more energy will be needed than has hitherto been displayed by the Department Public Works, to ensure the completion of the shelter that would be required by the close of March. April, May, and June, are the trying months at Kamptee, and it is desirable that the party should leave for Muhtoor accordingly.

7. In conclusion, I would merely add, that I deem it unnecessary to recapitulate what has been recorded by the Committee or the Chief Engineer. The immediate object aimed at is to obtain sanction for an experiment being made, if possible, next hot season; and until the result of that experiment can be ascertained, and the merits of Muhtoor placed beyond a doubt, it would be premature to enter on the consideration of building sites, and the other points that would have to be decided in connection with the establishment on a permanent footing of a Sanatarium with a large convalescent depôt. A copy of this communication with copies of the papers accompanying it, will be forwarded to the Secretary to the Government of India, in the Public Works Department,

to save time, as well as to dispose of an unanswered reference regarding Muhtoor.

LIST.

Enclosure No. 1.

I. From Chief Engineer to Commissioner of Nagpore, No. 2568, dated 23rd December 1858, with 10 annexures, including Marching map, shewing all the Military routes between Sehore, Saugor, Jubbulpore, Nagpore, and Ellichpore.

Enclosure No. 2.

I. From Commissioner to Brigadier Commanding at Kamptee, No. 725, dated 1st October 1859.

II. Brigadier in reply, No. 355, dated 11th October 1859.

III. Commissioner to Brigadier, No. 754, dated 17th October 1859.

IV. Brigadier to Commissioner, No. 147, dated 18th April 1860.

V. Brigadier in continuation, No. 150, dated 20th April 1860.

VI. Ditto No. 153, dated 21st ditto.

VII. Commissioner in reply, No. 160, dated 23rd ditto.

VIII. Commissioner to Deputy Commissioner, Chindwara, No. 302, dated ditto.

IX. Brigadier to Commissioner, No. 230, dated 7th August 1860, with 2 enclosures.

Enclosure No. 3.

I. From Brigadier to Commissioner, No. 188, dated 21st June 1860.

II. Report of a Committee appointed by the Brigadier to examine a site proposed for a Sanatarium at Muhtoor, dated 16th June 1860, with 1 annexure.

III. Appendix 1—Meteorological Tables at Kamptee and Muhtoor, with explanatory Memorandum.

IV. Appendix 2—Estimates for buildings, &c., &c.

V. Appendix 3—Estimates for Roads and all works connected with the proposed Sanatarium.

VI. Memorandum by Deputy Inspector General of Hospitals, Nagpore Force.

VII. Proceedings of the Madras Government, in the Military Department, dated 21st May 1860.

(Signed) E. K. Elliott,
Commissioner.

Copy of a letter, No. 2568, dated 23rd December 1858, from Colonel A. H. E. Boileau Chief Engineer, Nagpore, to George Plowden, Esquire, Commissioner of Nagpore.

I HAVE the honor of reporting, for your information, that in accordance with the permission granted in your letter, No. 390, dated the 1st October 1858, I proceeded to visit the hills at Muhtoor, 36 miles north-west of Chindwara, with a view of ascertaining their eligibility for the proposed Sanatarium for the European Troops about to be quartered in and near this province; and I have great pleasure in informing you that, although disabled for some days by ophthalmia brought on by constant exposure to the glare for ten hours daily, and afterwards by jungle fever caught during the above trip, by which the preparation of my report has been much retarded, I have obtained sufficient data for proving the great desirableness of establishing a Sanatarium at or near the above locality.

2. After taking hourly observations on the 2nd October last, with six thermometers and three barometers, in the Chief Engineer's Office at Seetabuldee, which is supposed to be 939 feet above the level of the sea, I quitted this station on the 5th, and made another hourly series of observations at Chindwara on the 10th, as also at Camp Muhtoor on the 14th idem; and again, after my return to Seetabuldee, similar sets were observed on the 23rd and 26th October, with a few observations at Camp Oomrait, on my way down from the hills. The result of all these barometrical measurements, combined with those taken by me with the same instruments at Chindwara on the 1st March 1857, and at Seetabuldee on the 9th and 10th idem, gives,

		Above Sea.
Chindwara above Nagpore	...	1122·3 and 2061·3
Oomrait above Chindwara	...	454·8 and 2516·1
Camp Muhtoor above Oomrait	...	764·6 and 3280·7
or more correctly by mean of all the observations		
Muhtoor above Chindwara	...	1235·7 and 3297·0
And the Sanatarium above Camp	...	2037 and 3500·7

3. The weather having been boisterous and rainy during a part of the four days of my stay at Camp Muhtoor, interfered consider-

ably with the vertical angles, (taken as well as other trigonometrical observations, to ascertain the distance and altitudes of the Mahadeo peaks, of which the height is considerably over-rated,) and must also have affected the barometrical readings. The accidental fracture of the upper spirit level of the large theodolite, after I had observed vertical angles at only two out of five of my stations, also hindered me from insuring accuracy by obtaining multiplied data ; but by way of establishing a check on my work, and ascertaining its true value, I have annexed to this report one sheet filled with barometrical observations, one sheet of barometrical calculations based thereon, one sheet of horizontal triangulations, and one sheet of vertical angles, all calculated in detail, so that they may be re-computed in the Surveyor General's Office, if required.

4. The country for some miles round three sides of the village of Muhtoor is a Table Land undulating and unencumbered with forest, though having numerous small eminences partially wooded, much of the soil is tilled, and a very large portion of it is covered with long grass intersected by small rivulets; the greater number of which run dry in the hot weather, though the Pench river close to Muhtoor contains water all the year round. This Table Land is six miles wide at Muhtoor having an ascent of about 500 feet in ¾ mile at its south edge from the village of Jamwyl, where the wheeled vehicles are left by pilgrims proceeding to the Mahadeo mountains; and my loaded camels ascended this *ghat* even in its unrepaired state. The north-western descent close to Muhtoor is, I believe, much more precipitous, and is probably double the depth of the southern Pass. A rough section of the latter is annexed, taken with a perambulator and Aneroid barometer, as also a rough plan of the road for the last twelve miles from Boodhwara to Camp Muhtoor.

5. The few hundreds of rupees placed by you at the disposal of the Executive Engineer of the Chindwara division, will enable him to make the present path practicable for doolies, as well as for loaded camels ; and the hill which I recommend for the site of the experimental Sanatarium, is already so accessible that I and Mr. J. H. Master, of the Madras Civil service, (to whom I am greatly indebted for his assistance during the above trip) rode on camels to its summit without any path being cut for us. For convalescents approaching from Saugor

and from the northward, the Doosawanee ghat is practicable for loaded camels; and for those coming south-west from Jubbulpore and Nursingpoor the same route might be followed until a more direct one shall be opened by Nerbapoor.

6. The accompanying skeleton map on a scale of 12 miles per inch, shows that Muhtoor lies in the centre of fourteen stations, viz., Sehore (114), Saugor (104), Damoh (117), Jubbulpore (105), Mundla (117), Nursingpoor (59), Hooshungabad (62), Baitool (50), Chindwara (28), Seonee (64), Bhundarah (102), Kamptee (83), Nagpore (84), and Ellichpore (98); the respective direct distances of each being marked in brackets, and not one of them is 120 miles off as the crow flies. The stations of Kamptee, Saugor, and Jubbulpore are provided with accommodation for 1800, 1200, and 1000 European Soldiers, and are distant 83, 104, and 105 direct miles, or about 9,12, and 12 marches, taking 9 straight miles for a stage, or at the outside from 13 to 14 marches, so that the sick men or convalescents of a Force of 4,000 Europeans, amounting probably to 200 men and perhaps 20 women, might be conveyed to a healthy hill station 3,500 feet above the sea in half a month by the ordinary Military marches.

7. There is abundance of ground near Muhtoor, ranging from 3,300 to nearly 3,500 feet above the sea, available for building sites for private individuals who may wish to locate their families near the proposed Sanatarium during each hot season, or to recruit their own health without undertaking distant and expensive voyages to sea, (Calcutta being 872 miles from Nagpore viâ Benares, Madras 704, and Bombay 514 miles) or to the still more distant Sanataria at Darjeeling, Landour, Mount Aboo, and Ootakamund, or elsewhere in the Neelgiree hills. It is but a few days since the Superintending Surgeon informed me that a Medical Committee had on the preceding day recommended a European Soldier to be sent for change of air to St. Thomas's Mount near Madras, a journey of 700 miles instead of going 100 to Muhtoor.

8. The high ridges lying to the westward of the village of Muhtoor and of the station D. in my sheet of triangles, may, on further examination, be found to be well adapted for a permanent Sanatarium, being somewhat higher than the site selected for the temporary or experimental establishment, or they might perhaps afford accommoda-

tion for a whole Regiment of Europeans,* should such a measure be found desirable hereafter, and therefore they ought to be held in reserve, no private individuals being allowed to build on them ; nor should their integrity be marred by erecting any of the temporary buildings there. The same may be said of the high ridges east of the so called " Sanatarium Hill," on which latter locality I recommend only, as many temporary convalescent barracks to be built as will in the first instance accommodate 5 per cent. on the European Force to be located at Kamptee, which may aggregate 1,800 men and 200 women, or 2,000 in all.

9. The standard plan for a convalescent barrack has been slightly modified by me, in communication with the Superintending Surgeon J. Maule, Esquire, and a copy of it is forwarded herewith. It contains accommodation for 16 men and 2 families or 2 non-commissioned Officers, so that five similar barracks would hold 10 Serjeants and 80 Privates—total 90 men, or just 5 per cent. on 1,800 individuals. A sixth barrack might be required of the full size (97 × 47 feet external dimensions,) as a hospital, for which a site has also been selected, and a seventh, of little more than half that size for 9 or 10 women. A Commanding Officer's house, quarters for a subordinate Medical Officer, a guard-room, commissariat store, and a few other buildings would be wanted, but all might in the first instance, be of an inexpensive nature, (even substituting huts for barracks, as detailed below in the 11th paragraph,) there being abundance of grass for thatching, bamboos not far off, and the valley of the Dainwah near at hand, with a considerable supply of timber.

10. The huts or small houses occupied by the Ghond inhabitants of Muhtoor, are said to cost about six rupees, and may perhaps be 21 × 12 or 252 superficial feet; and as each barrack for 18 people covers nearly 5000 feet, it would be equal in area to about 20 such houses, and perhaps to 3 of them in height, or 60 houses in all, and if their cost, when built by the Public Works Department, were double that incurred by the hill people, a single rough barrack for 18 men would cost Rupees 720, or the price of 120 Ghondee huts. With three chimneys of brickwork in lime, five doors, and twelve windows, together with foundations and plinth of rough stone, and superstructure of sun-dried bricks in mud, each barrack would probably cost more than 1000 Rupees; though 720 might be sufficient by using wattle and dab for the walls, and other economical expedients.

11. At the rate assumed in the preceding paragraph, 5000 Rupees would furnish six cheap convalescent barracks and a hospital, to which Rupees 4000 more might be added for the other buildings mentioned in my 9th paragraph, including the forming tanks for water, cutting roads, laying out Soldiers' gardens, &c.; but if instead of lofty buildings to hold 18 men each, the platform measuring 98×48 feet with walls 2½ feet thick of rough stone, was made in the first instance, to hold 18 huts, each 12 feet square, (in pairs, but separated by a party wall one foot thick,) with 4 transverse lanes 5¾ feet wide, and 4 longitudinal paths of 3 feet, every man would have a house to himself and would probably be well sheltered at one-third or one-half the expense of a barrack. A sketch is annexed, showing the way in which a cluster of nine double huts might be arranged for 16 men, who would use the central hut in front for messing.

12. The distances measured by me between Kamptee Dâk Bungalow and the staging house at Chindwara amount to 77m., 0f., 62yds., and it is 36m., 0f., 211yds., from the latter place viâ Oomret to camp Muhtoor, making a total of 113m., 1f., 53yds. But instead of losing an entire march by going round through Chindwara it appears better to adopt the pilgrim road from Oomrait through Budnoor and Mohkher to Talao, by which I returned from Muhtoor, over very favorable ground, and which reduces the distance from Kamptee to Muhtoor to 104m., 2f., 126yds. This line is marked by red dots in the map, as are the unknown portions of the routes between Muhtoor and Saugor, and Muhtoor and Jubbulpore, concerning which I am already in correspondence with the Chief Engineer of the Saugor and Nurbudda territories, and with the Deputy Commissioner of Hoshungabad.

13. The Executive Engineer of the Chindwara division should be instructed to fill in all the topographical details of the Table Land as far as the foot of the Doosawanee ghat to the northward, (that village being perhaps 3 miles east-north-east from the Sanatarium, which is a mile and a half or 2 miles north from the village of Muhtoor) and for 3 or 4 miles south-west from the temporary Sanatarium, including all the high ground mentioned in the 4th paragraph, near the source of the river Pench. And after the arrival of the two native Sub-Surveyors, now on their way from Roorkee, they might explore the unknown routes from Muhtoor to Samlakhera, and from Sarrye viâ Jamwye and Muhtoor to Mohuljeer within the Chindwara district, and even viâ Futtehpoor and Oomurda

to Pertabgurh in the Bhopal territory on the road to Saugor, if the Commissioner and the Chief Engineer of that province have no objection to their being so employed.

14. The Executive Officer, Captain Saunders, might also be instructed to frame an estimate for convalescent barracks and other buildings which would be required if 100 convalescents from Kamptee were sent up to Muhtoor; and if this place were established as a Sanatarium for the European Troops at Saugor and Jubbulpore, as well as those of the Nagpore Force, about double the number of persons would have to be accommodated, though perhaps one Medical Officer with one Subordinate would be sufficient for all—and the Assistant Surgeon might prefer providing house-room for himself to having 30 Rupees deducted monthly from his pay as house rent.

15. This report and all the enclosures are submitted in duplicate.

MEMORANDUM OF ENCLOSURES.

1. A sheet of Barometrical observations.
2. A sheet of Barometrical computations.
3. A sheet of Horizontal triangulations.
4. A sheet of calculations of vertical angles.
5. A rough plan of the road from Boodhwara viâ Jamwye to camp Muhtoor, on a scale of 600 yards per inch.
6. A rough section of the same.
7. A plan of the base and triangulation observed at, and near camp Muhtoor, on a scale of 600 feet per inch.
8. (Modified) standard plan of a convalescent barrack for 2 Serjeants and 16 Privates, on a scale of 8 feet per inch.
9. Sketch of a cluster of huts and mess-room for 16 Privates, occupying the same space as the foundation of a barrack 98×48 feet, on a scale of 8 feet per inch.
10. Marching map on a scale of 12 miles per inch, showing all the Military routes between Sehore, Saugor, Jubbulpore, Nagpore and Ellichpore, and of their probable communication with the proposed Sanatarium near Muhtoor.

At Deputy Commissioner's, Chindwara, 1st March 1857.

Hour.	Aneroid 13·154.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
9 A. M.	72·0	27·730	—·003	75·0	27·851	—·010
10 „	75·0	·740	+·007	77·0	·869	+·008
11 „	78·0	·750	+·017	80·5	·876	+·015
Noon.	81·5	·740	+·007	82·0	·882	+·021
1 P. M.	83·5	·730	—·003	82·0	·850	—·011
2 „	87·0	·725	—·008	84·0	·848	—·013
3 „	89·0	·715	—·018	87·0	·849	—·012
Means.	80·86	27·733	......	81·07	—0·028 27·861	......

At Seetabuldee, 9th March 1857.

Hour.	Aneroid 131·54. Thermometer.	Aneroid 131·54. Barometer.	Aneroid 131·54. Diff. Mean.	Adie's Mercurial. Thermometer.	Adie's Mercurial. Barometer.	Adie's Mercurial. Diff. Mean.
9 A. M.	78·5	28·930	+·040	79·0	28·902	+·006
10 "	81·0	·945	+·055	82·0	·950	+·064
11 "	82·5	·935	+·045	83·0	·916	+·030
Noon.	83·0	·920	+·030	86·0	·901	+·015
1 P. M.	83·5	·870	—·020	85·5	·879	—·007
2 "	80·5	·835	—·055	77·5	·811	—·075
3 "	75·0	·795	—·095	74·0	·841	—·045
Means.	83·43	28·890	......	81·00	28·886	......

At Seetabuldee, 10*th March* 1857.

Hour.	Aneroid 13·154.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.	
9 A. M.	69·0	28·955	+·040	67·0	28·921	+·001
10 „	70·5	·960	+·015	70·5	·921	+·001
11 „	72·0	·940	+·025	73·0	·926	+·006
Noon.	73·0	·925	+·010	75·5	·933	+·013
1 P. M.	75·0	·922	—·015	77·0	·921	+·001
2 „	76·5	·870	—·045	80·5	·911	—·009
3 „	78·0	·855	—·060	81·0	·902	—·018
Means...	73·43	28·915	......	74·9[illegible]	28·920	......

At Chindwara Dâk Bungalow, 11*th October* 1858.

Hour.	Aneroid 13·154. Thermometer.	Barometer.	Diff. Mean.	Aneroid 13·157. Thermometer.	Barometer.	Diff. Mean.	Adie's Mercurial. Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A.M.	71·0	27·610		55·0	27·595		69·75	27·685	
10 „	75·0	·675		60·0	·655		77·00	·748	
2 P.M.	78·5	·600		63·0	·580		82·30	·710	
6 „	75·5	·605		60·5	·590		78·30	·697	
Means.	75·00	27·623	...	59·63	27·605	...	76·81	27·710	...

At Camp Oomrait, 18*th October* 1858.

5 P.M.	72·7	27·140		57·0	27·135		77·5	27·260	
6 „	67·3	27·120		51·7	27·110		71·3	27·235	

And at the same place on the 19*th idem.*

6 A.M.	57·3	27·075		42·3	27·065		59·3	27·262	
Means.	65·77	27·112	...	50·33	27·103	...	69·37	27·252	...

At Chief Engineer's, Seetabuldee, 2nd October 1858.

Hour.	Aneroid 13·154.			Aneroid 13·157.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A.M.	76·0	28·810	—·025	60·5	28·830	—·030	78·0	28·775	—·014
7 ,,	76·0	·840	+·005	60·5	·870	+·010	78·5	·784	—·005
8 ,,	77·0	·870	+·035	61·5	·900	+·040	79·0	·804	+·015
9 ,,	77·5	·890	+·055	62·0	·910	+·050	80·0	·806	+·017
10 ,,	78·0	·890	+·055	62·0	·920	+·060	80·5	·806	+·017
11 ,,	79·0	·875	+·040	63·0	·905	+·045	81·5	·810	+·021
Noon.	80·0	·850	+·015	64·0	·875	+·015	81·5	·808	+·019
1 P.M.	80·0	·820	—·015	64·0	·840	—·020	81·5	·792	+·003
2 ,,	81·0	·795	—·045	65·0	·820	—·040	81·5	·779	+·010
3 ,,	81·5	·780	—·055	66·0	·810	—·050	82·0	·769	—·020
4 ,,	82·5	·790	—·045	67·0	·810	—·050	82·5	·767	—·022
5 ,,	83·0	·810	—·025	67·0	·825	—·035	82·0	·770	—·019
6 ,,									
Sums.									
Means.	+3·33 79·30	28·835	...	+19·05 63·58	28·860	...	80·71	28·789	...

At Chindwára Dák Bungalow, 10th October 1858.

Hour.	Aneroid 13·154.			Aneroid 13·157.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A. M.	67·5	27·590	—·040	51·5	27·580	—·038	64·75	27·691	—·036
7 „	69·0	·620	—·010	53·5	·615	—·003	67·00	·711	—·016
8 „	72·0	·660	+·030	56·5	·655	+·037	75·30	·751	+·024
9 „	73·5	·680	+·050	58·0	·670	+·052	77·00	·759	+·032
10 „	75·5	·690	+·060	60·0	·680	+·062	78·70	·769	+·042
11 „	76·0	·680	+·050	60·5	·670	+·052	79·25	·764	+·037
Noon.	77·0	·660	+·030	61·5	·645	+·027	79·75	·750	+·023
1 P. M.	77·0	·625	—·005	61·5	·620	+·002	80·00	·735	+·008
2 „	77·0	·600	—·030	61·5	·590	—·028	79·75	·716	—·011
3 „	77·0	·585	—·045	61·5	·580	—·038	79·00	·708	—·019
4 „	77·0	·590	—·040	61·5	·565	—·053	79·50	·677	—·050
5 „	77·0	·595	—·035	61·5	·575	—·043	79·75	·706	—·021
6 „	76·0	·610	—·020	61·0	·595	—·023	78·75	·713	—·013
Sums.									
Means.	+1·71 74·73	27·630	...	+17·21 59·23	27·618	...	76·81	27·727	...

At Camp Muhtoor, 14th October 1858.

Hour.	Aneroid 13·154.			Aneroid 13·157.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A.M.	65·0	26·440	—·010	49·0	26·405	—·013	67·7	26·576	+·008
7 "	67·0	·460	+·010	51·0	·425	+·007	69·7	·596	+·028
8 "	67·0	·480	+·030	51·0	·440	+·022	69·7	·606	+·038
9 "	69·5	·490	+·040	53·5	·460	+·042	72·3	·620	+·052
10 "	72·5	·515	+·065	57·0	·480	+·062	76·3	·638	+·070
11 "	74·0	·505	+·055	59·0	·475	+·057	77·5	·633	+·065
Rain Noon	73·5	·480	+·030	58·0	·445	+·027	75·7	·604	+·036
1 P.M.	71·0	·445	—·005	55·5	·410	—·008	73·5	·569	+·001
2 "	69·5	·420	—·030	53·5	·395	—·023	71·3	·547	—·021
3 "	67·5	·405	—·045	51·3	·375	—·043	69·5	·506	—·062
Rain 4 "	66·5	·395	—·055	50·5	·370	—·048	69·0	·498	—·070
Rain 5 "	65·0	·405	—·045	48·7	·370	—·048	67·5	·497	—·071
6 "	66·0	·415	—·035	50·5	·380	—·038	68·5	·499	—·069
Sums.									
Means.	+2·34 68·77	26·450	...	+18·15 52·96	26·418	...	71·40	26·568	...

At Camp Muhtoor, 15th October 1858.

Hour.	Aneroid 13·154.			Aneroid 13·157.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A. M.	63·5	26·410	—·010	47·5	26·375	—·029	66·3	26·572	—·001
10 „	73·7	·500	+·080	60·0	·525	+·121	76·3	·631	+·058
2 P. M.	69·5	·390	—·030	54·0	·360	—·044	73·5	·561	—·012
6 „	67·3	·380	—·040	52·0	·355	—·049	69·7	·527	—·046
Means.	68·50	26·420	...	53·38	26·406	...	71·45	26·573	...

At Camp Muhtoor, 16th October 1858.

Hour.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
6 A. M.	60·5	26·365	—·005	45·0	26·330	—·005	65·5	26·531	+·001
6 P. M.	66·5	26·375	+·005	52·0	26·340	+·005	69·5	26·529	—·001
Means.	63·50	26·370	...	48·50	26·335	...	67·50	26·530	...

At Camp Muhtoor, 17th October 1858.

Hour.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
6 A. M.	59·0	26·365	—·050	43·3	26·320	—·053	60·7	26·502	—·040
10 „	75·0	·515	+·100	60·0	·480	+·107	75·5	·612	+·070
2 P. M.	73·0	·410	—·005	57·7	·365	—·008	75·7	·550	+·008
6 „	64·3	·370	—·045	49·0	·325	—·048	65·0	·502	—·040
Means.	67·83	26·415	...	52·50	26·373	...	69·23	26·542	...

At the Chief Engineer's, Seetabuldee, 23*rd October* 1858.

Hour.	Aneroid 13·154.			Aneroid 13·157.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A.M.	68·0	28·825	—·016	52·0	28·855	—·009	67·5	28·887	+·003
7 „	67·5	·840	—·001	52·3	·865	+·001	68·7	·915	+·031
8 „	68·7	·860	+·019	53·5	·880	+·016	70·7	·906	+·022
9 „	70·3	·875	+·034	55·3	·905	+·041	73·3	·914	+·030
10 „	72·7	·880	+·039	58·0	·910	+·046	75·7	·930	+·046
11 „	74·5	·870	+·029	60·0	·895	+·031	77·7	·911	+·027
Noon.									
1 P.M.	77·0	·830	—·011	62·0	·860	—·004	79·7	·893	+·009
2 „	78·0	·820	—·021	63·3	·840	—·024	80·5	·863	—·021
3 „	79·3	·820	—·021	64·3	·830	—·034	81·5	·857	—·027
4 „	80·3	·820	—·021	65·0	·840	—·024	81·5	·845	—·039
5 „	80·0	·825	—·016	64·7	·840	—·024	81·0	·839	—·045
6 „	78·5	·830	—·011	62·7	·850	—·014	78·7	·849	—·035
Sums.	...	10·095	...	...	10·370	...	...	10·609	...
Means.	+3·00 74·57	28·841	...	+18·14 59·43	28·864	...	76·38	28·884	...

At the Chief Engineer's, Seetabuldee, 26th October 1858.

Hour.	Aneroid 13·154.			Aneroid 13·157.			Adie's Mercurial.		
	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.	Thermometer.	Barometer.	Diff. Mean.
		Inches.			Inches.			Inches.	
6 A.M.	65·0	28·770	—·046	49·0	28·795	—·045	65·5	28·844	—·034
7 ,,	64·5	·780	—·036	48·7	·815	—·025	66·0	·858	—·020
8 ,,	66·3	·810	—·006	51·0	·830	—·010	69·0	·876	—·002
9 ,,	69·0	·835	+·019	54·0	·865	+·025	72·5	·906	+·028
10 ,,	71·7	·850	+·034	57·0	·880	+·040	74·7	·921	+·043
11 ,,	73·7	·840	+·024	58·7	·875	+·035	76·7	·904	+·026
Noon.	75·0	·825	+·009	60·3	·860	+·020	77·7	·900	+·022
1 P.M.	76·0	·620	+·004	61·3	·840	+·000	78·7	·888	+·010
2 ,,	77·5	·805	—·011	63·0	·825	—·015	80·5	·876	—·002
3 ,,	78·5	·810	—·006	64·3	·825	—·015	81·3	·862	—·016
4 ,,	79·7	·820	+·004	64·7	·830	—·010	81·0	·864	—·014
5 ,,	79·3	·820	+·004	64·0	·840	—·000	79·7	·852	—·026
6 ,,	77·0	·825	+·009	61·7	·845	+·005	78·3	·864	—·014
Sums.	...	10·610	...	..	10·925	...	...	11·415	...
Means.	+3·26 73·31	28·816	...	+18·39 58·28	28·840	...	75·51	28·878	...

Barometrical Calculations.

Seetabuldee and Chindwara, taken in March 1857, with a Mercurial Barometer by Adie.

1. By 7 Observations at each.

1st March 1857, at Chindwara, Latitude	...		22° ·03′
Barometer = 27·833 and Thermometer	..	=	81° ·07′
9th March 1857, at Seetabuldee, Latitude	..		21° ·09′
Barometer = 28·886 and Thermometer	..	=	81° ·00′
Logarithm of 27·833	...	=	1·444560
B = 81° ·1′ — 81° ·0′ = 0° ·1′	..	=	9·999996
Sum	...	=	1·444556
Logarithm of 28·886	..	=	1·460687
R = Difference	..	=	0·016131
Logarithm of R	..	=	8·207661
A = 81° ·1′ + 81° ·0′ = 162° ·1′	..	=	4·825573
C = Mean Latitude = 21° ·36′	...	=	0·000852
Difference in Alt. = 1081·6	..	=	3·034086

2. Also by 7 Observations at each.

1st March 1857, at Chindwara, Latitude	...		22° ·03′
Barometer = 27·833 and Thermometer	...	=	81° ·07′
10th March 1857, at Seetabuldee, Latitude	...		21° ·09′
Barometer = 28·920 and Thermometer	...	=	74° ·93′
By trustworthy observations.			
Logarithm of 27·833	...	=	1·444560
B = 81° ·1′ — 74° ·9′ = 6° ·2′	...	=	9·999731
Sum	..	=	1·444291
Logarithm of 28·920	...	=	1·461198
R = Difference	..	=	0·016907

Logarithm of R	.. =	8·228067
A = 81° ·1′ + 74° ·9′ = 156° ·0′	... =	4·822910
C = Mean Latitude = 21° ·36′	.. =	0·000852
Difference in Alt. = 1126·8	... =	3·051829

Setabuldee and Chindwara, taken in October 1858, *with a Mercurial Barometer by Adie.*

3. By 12 Observations at each, omitting 6 p. m. at Chindwara.

2nd October 1858, at Setabuldee, Latitude	...	21° ·09′
Mercurial = 28·789 and Thermometer	.. =	80° ·71′
10th October 1858, at Chindwara, Latitude	...	22° ·03′
Barometer = 27·728 and Thermometer	... =	76° ·65′
Logarithm of 27·728	... =	1·442919
B = 80° ·7′—76° ·7′ = 4° ·0′	... =	0·000174
Sum	.. =	1·443093
Logarithm of 28·789	... =	1·459227
R = Difference	... =	0·016134
Logarithm of R	... =	8·207742
A = 80° ·7′ + 76° ·7′ = 157° ·4′	.. =	4·823527
C = Mean Latitude = 21° ·36′	... =	0·000852
Difference in Alt. = 1076·8	.. =	3·032121

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4. By 3 Observations at each, taken at 6 and 10 a. m., and 2 p. m

2nd October 1858, at Setabuldee, Latitude	...	21° ·09′
Barometer = 28·787 and Thermometer	.. =	80° ·00′
11th Otcober 1858, at Chindwara, Latitude	..	22° ·03′
Barometer = 27·714 and Thermometer	... =	76° ·35′
Logarithm of 27·714	... =	1·442699
B = 80° ·0′—76° ·4′ = 3° ·6′	... =	0·000154

Sum	... = 1·442853
Logarithm of 28·787	.. = 1·459196
R = Difference	.. = 0·016343
Logarithm of R	... = 8·213332
A = 80° ·0′ + 76° ·4′ = 156° ·4′	.. = 4·823086
C = Mean Latitude = 21° ·36′	.. = 0·000852
Difference in Alt. = 1089·6	... = 3·037270

5. By 12 Observations at each, omitting Noon at Chindwara.

10th October 1858, at Chindwara, Latitude ..	22° ·03′
Barometer = 27·725 and Thermometer ... =	76° ·56′
23rd October 1858, at Seetabuldee, Latitude ...	21° ·09′
Barometer = 28·884 and Thermometer ... =	76° ·38′
Logarithm of 27·725 ... =	1·442872
B = 76° ·6′ — 76° ·4′ = 0° ·2′ ... =	9·999992
Sum ... =	1·442864
Logarithm of 28·884 ... =	1·460657
R = Difference ... =	0·017793
Logarithm of R ... =	8·250249
A = 76° ·6′ + 76° ·4′ = 153° ·0′ ... =	4·821600
C = Mean Latitude = 21° ·36′ ... =	0·000852
Difference in Alt. = 1182·2 ... =	3·072701

6. By 13 Observations at each.

10th October 1858, at Chindwara, Latitude ...	22° ·03′
Barometer = 27·727 and Thermometer ... =	76° ·81′
26th October 1858, at Seetabuldee, Latitude ...	21° ·09′
Barometer = 28·878 and Thermometer .. =	75° ·51′

Logarithm of 27·727	... =	1·442901
B = 76° ·8′ — 75° ·5′ = 1° ·3′	... =	9·999944
Sum	... =	1·442845
Logarithm of 28·878	... =	1·460567
R = Difference	... =	0·017722
Logarithm of R	... =	8·248513
A = 76° ·8′ + 75° ·5′ = 152° ·3′	... =	4·821292
C = Mean Latitude = 21°·36′	... =	0·000852
Difference in Alt. = 1176·7	... =	3·070657

Ditto by No. 5 = 1182·2
Ditto by No. 4 = 1089·6
Ditto by No. 3 = 1076·8
Ditto by No. 2 = 1126·8
Ditto by No. 1 = 1081·6

Sum 6) 6733·7

Mean = 1122·3 { Seetabuldee or Nagpore below Chindwara.

Chindwara and Camp Muhtoor.

7. By 13 Observations at each.

10th October 1858, at Chindwara, Latitude	..	22° ·03′
Barometer = 27·727 and Thermometer	... =	76° ·81′
14th October 1858, at Muhtoor, Latitude	...	22° ·13′
Barometer = 26·568 and Thermometer	... =	71° ·40′
Logarithm of 26·568	... =	1·424359
B = 76° ·8′ — 71° ·4′ = 5° ·4′	.. =	0·000234
Sum	... =	1·424593
Logarithm of 27·727	... =	1·442903
R = Difference	. =	0·018310

Logarithm of R	... =	8·262688
A = 76° ·8 + 71° ·4′ = 148° ·2′	... =	4·819486
C = Mean Latitude = 22° ·08′	... =	0·000836
Difference in Alt. = 1210·6	.. =	3·083010

Add Chindwara 1122·3 above Nagpore.
Camp Muhtoor 2332·9 above Nagpore.

8. By 4 Observations at each, taken at 6 and 10 a. m., and 2 and 6 p. m.

11th October 1858, at Chindwara, Latitude ...		22° ·03′
Barometer = 27·710 and Thermometer	... =	76° ·84′
15th October 1858, at Camp Muhtoor, Latitude		22° ·13′
Barometer = 26·573 and Thermometer	.. =	71° ·45′
Logarithm of 26·573	... =	1·424441
B = 76° ·84′—71° ·45′ = 5° ·39′	... =	0·000234
Sum	... =	1·424675
Logarithm of 27·710	.. =	1·442637
R = Difference	... =	0·017962
Logarithm of R	... =	8·254355
A = 76° ·84′ + 71° ·45′ = 148° ·29′	... =	4·819525
C = Mean Latitude = 22° ·08′	... =	0·000836
Difference in Alt. = 1187·7	.. =	3·074716

Add Chindwara 1122·3 above Nagpore.
Camp Muhtoor 2310·0 above Nagpore.

Seetabuldee and Camp Muhtoor.

9. By 12 Observations at each, omitting 6 p. m. at Muhtoor.

2nd October 1858, at Seetabuldee, Latitude ...		21° ·09′
Barometer = 28·789 and Thermometer	.. =	80° ·71′
14th October 1858, at Camp Muhtoor, Latitude		22° ·13′
Barometer = 26·574 and Thermometer	... =	71° ·64′

Logarithm of 26·574	.. =	1·424457
B = 80° ·7′—71° ·6′ = 9° ·1′	.. =	0·000394
Sum	.... =	1·424851
Logarithm of 28·789	.. =	1·459227
R = Difference	... =	0·034376
Logarithm of R	... =	8·536255
A = 80° ·7′ + 71° ·6′ = 152° ·3′	... =	4·821292
C = Mean Latitude = 21° ·41′	... =	0·000852
Altitude in feet = 2282·4	... =	3·358399

10. By 12 Observations at each, omitting Noon at Muhtoor.

14th October 1858, at Muhtoor, Latitude	..	22° ·13′
Barometer = 26·566 and Thermometer	... =	71° ·04′
23rd October 1858, at Seetabuldee, Latitude	...	21° ·09′
Borometer = 28·884 and Thermometer	... =	76° ·38′
Logarithm of 26·566	.. =	1·424326
B = 76° ·4′—71° ·0′=5° ·4′	... =	0·000234
Sum	.. =	1·424560
Logarithm of 28·884	.. =	1·460657
R = Difference	.. =	0·036097
Logarithm of R	.. =	8·557471
A = 76° ·4′ + 71° ·0′ = 147° ·4′	.. =	4·819126
C = Mean Latitude = 21° ·41′	.. =	0·000852
Altitude in feet = 2384·8	.. =	3·377449

11. By 13 Observations at each.

14th October 1858, at Camp Muhtoor, Latitude..		22° ·13′
Mercurial = 26·568 and Thermometer	.. =	71° ·40′

26th October 1858, at Seetabuldee, Latitude	..	21° ·09′
Mercurial = 28·878 and Thermometer	.. =	75° ·51′
Logarithm of 26·568	.. =	1·424359
B = 75° ·5′—71° ·4′ = 4° ·1′	... =	0.000171
Sum	... =	4·424530
Logarithm of 28·878	... =	1·460567
R = Difference	.. =	0·036037
Logarithm of R	... =	8·556749
A = 75° ·5′ + 71° ·4′ = 146° ·9′	.. =	4·818966
C = Mean Latitude = 21° ·41′	.. =	0·000852
Altitude in feet = 2379·6	.. =	3·376507

12. By 3 Observations at each, taken at 6 and 10 a. m., and 2 p. m.

17th October 1858, at Muhtoor, Latitude	...	22° ·13′
Mercurial = 26·555 and Thermometer	... =	70° ·63′
27th October 1858, at Seetabuldee, Latitude	...	21° ·09′
Mercurial = 28·948 and Thermometer	... =	74° ·97′
Logarithm of 26·555	.. =	1·424146
B = 75° ·0′—70° ·6′ = 4° ·4′	.. =	0·000190
Sum	.. =	1·424336
Logarithm of 28·948	.. =	1·461619
R = Difference	.. =	0·037283
Logarithm of R	.. =	8·571511
A = 75° ·0′ + 70° ·6′ = 145° ·6′	... =	4·818334
C = Mean Latitude = 21° ·41′	.. =	0·000852
Altitude in feet = 2458·5	.. =	3·390697

Ditto by No. 11 = 2379·6
Ditto by No. 10 = 2384·8
Ditto by No. 9 = 2282·4

Ditto by No. 8 = 2310·0
Ditto by No. 7 = 2332·9

Sum 6) 14148·2 } Camp Muhtoor above Nagpore or Seetabuldee.

Mean = 2358·0

Chindwara and Camp Oomrait.

13. By 3 Observations at each, taken at 6 a. m., and at 5 and 6 p. m.

10th October 1858, at Chindwara, Latitude	..	22° ·03′
Mercurial = 27·703 and Thermometer	... =	74° ·42′
18th and 19th, at Oomrait, Latitude	..	22° ·08′
Mercurial = 27·252 and Thermometer	... =	69° ·37′
Logarithm of 27·252	... =	1·435398
B = 74° ·4′—69° ·4′ = 5° ·0′	.. =	0·000220
Sum	... =	1·435618
Logarithm of 27·703	... =	1·442527
R = Difference	.. =	0·006909
Logarithm of R	.. =	7·839415
A = 74° ·4′ + 69° ·4′ = 143° ·8′	.. =	4·817560
C = Mean Latitude = 22° ·06′	... =	0·000837
Difference in Alt. = 454·79	.. =	2·657812

Camp Oomrait and Camp Muhtoor.

14. By 3 Observations at each, taken at 6 a. m., and at 5 and 6 p. m.

14th October 1858, at Camp Muhtoor, Latitude		22° ·13′
Mercurial = 26·524 and Thermometer	.. =	67° ·90′
18th and 19th, at Oomrait, Latitude	...	22° ·08′
Mercurial = 27·252 and Thermometer	.. =	69° ·37′
Logarithm of 26·524	.. =	1·423639
B = 69° ·4′—67° ·9′ = 1° ·5′	.. =	0·000065

Sum	... =	1·423704
Logarithm of 27·252	... =	1·435398
R = Difference	... =	0·011694
Logarithm of R	.. =	8·067963
A = 69° ·4′ + 67° ·9′ = 137° ·3	... =	4·814645
C = Mean Latitude = 22° ·11′	.. =	0·000831
Difference in Alt. = 764·61	.. =	2·883442

Add Chindwara 454·79, below Oomrait
Chindwara 1219·40, below Muhtoor
Ditto by No. 7 = 1210·6, by 13 observations

Assuming the height of the Chief Engineer's Office at Nagpore (Seetabuldee) above the sea to be, as given in Major

Scotts' map	.. =	939·0 feet.
Chindwara would be	... =	2061·3
Oomrait 3297·0—764·6	... =	2532·4
Camp Muhtoor	.. =	3297·0
Sanatarium by Trigonometry	.. =	3500·7

To ascertain the value of Dent's Aneroid Barometer, No. 13157 for the section of the road and *Ghaut* between Budhwara near Oomrait, and Camp Muhtoor, there is recorded on the 14th October 1858

At Camp Muhtoor Aneroid No. 13157

At 6 A. M. =	26·405 inches	and		..	68° ·0′
At 5 P. M. =	26·370	„	„	..	67° ·0′
At 6 P. M. =	26·380	„	„	..	67° ·7′
Mean =	26·385	„	„	..	67° ·57′

At Camp Oomrait in October

18th at 5 P. M. =	27·135 inches, and			..	75° ·2′
18th at 6 P. M. =	27·110	„	„	..	71° ·7′
19th at 6 A. M. =	27·065	„	„	..	58° ·7′

Mean	= 27·103 inches and	...	68° ·53′
19th Oct. at Muhtoor 26·385	„ „	...	67° ·57′

Difference 0· 718 in inches.

The difference in altitude by the mercurial barometer being 764·61 feet, therefore 1 inch of Aneroid = 1064·9 feet, at the mean elevation of about 2914·7 feet above the sea, and at a mean temperature of 68° ·05′.

Calculations of the Horizontal Angles.

In the Triangle A B C

Measured base A B	... = 1282·25 feet.
A = 56° ·25′; B = 66° ·38′; C	... = 56°·57′
Log. Sine C = 56° ·57′	... = 9·923345
Arith. Comp.	.. = 0.076655
Log. A B = 1282·25	... = 3·107973
Log. Sine B = 66° ·38′	... = 9·962836
A C = 1404·3	... = 3·147464
Arith. Comp. C + Log. A B	... = 3·184628
Log. Sine A = 56° ·25′	... = 9·920688
B C = 1274·4	... = 3·105316

In the Triangle B C D

Calculated side B C	... = 1274·4 feet.
B = 103° ·38′; C = 46° ·49′; D	... = 29°·33′
Log. Sine D = 29° ·33′	... = 9·693008
Arith. Comp.	.. = 0·306992
Log. B C = 1274 ·4	.. = 3·105316
Log. Sine C = 46° ·49′	... = 9·862827
B D = 1881·2	= 3·275135

Arth. Comp. D + Log. B C	... = 3·412808
Log. Sine B = 103° ·38′	... = 9·987588
C D = 2511·3	... = 3·399896

In the Triangle A C E

Calculated side A C	.. = 1404·3 feet.
A = 145° ·48′; C = 29° ·04′; E	... = 5° ·08′
Log. Sine E = 5° ·08′	... = 8·951696
Arith. Comp.	... = 1·048304
Log. A C = 1404·3	... = 3·147464
Log. Sine C = 29° ·04′	... = 9·686482
A E = 7625·2	... = 3·882250
Arth. Comp. E + Log. A C	... = 4·195768
Log. Sine A = 145° ·48′	... = 9·749801
C E = 8822·0	... = 3·945569

In the Triangle B C E

Calculated side B C	... = 1274·4 feet.
B = 85° ·41′; C = 86° ·01′; E	... = 8° ·18′
Log. Sine E = 8° ·18′	.. = 9·159435
Arith. Comp.	... = 0·840565
Log. B C = 1274·4	... = 3·105316
Log. Sine C = 86° ·01′	... = 9·998950
B E = 8807·1	... = 3·944831
Arith. Comp. E + Log. B C	... = 3·945881
Log. Sine B = 85° ·41′	... = 9·998766
C E = 8803·3	.. = 3·944647

IN THE TRIANGLE C D E

Calculated side C D	.. =	2511·3 feet.
C = 132°·50′; D = 37°·16′; E	... =	9°· 54′
Log Sine E = 9° ·54′	... =	9·235349
Arith. Comp.	.. =	0·764651
Log. C D = 2511·3	.. =	3·399896
Log. Sine C = 132° ·50′	.. =	9·865302
D E = 10711·5	.. =	4·029849
Arith. Comp. E + Log. C D	... =	4·164547
Log. Sine D = 37° ·16′	... =	9·782132
C E = 8844·6	... =	3·946679

Do by B C E = 8803·3
Do by A C E = 8822·0
Sum 3)26469·9

8823·3 by mean of 3

IN THE SAME TRIANGLE C D E

Calculated side C E	=	8823·3 by mean of 3.
Log. Sine D = 37° ·16′	... =	9.782132 feet.
Arith. Comp.	... =	0·217868
Log. C E = 8823·3	... =	3·945631
Log. Sine C = 132° ·50	... =	9·865302
D E = 10685·7	... =	4·028801

and 10711·5 as above ..

Mean of 2 = 10698·6 from which is to be deducted 51·0 feet, for the position of the Theodolite No. 121.

For the Tidee Kothee Peak = F

In the Triangle D E F

Calculated side D E	.. =	10698·6 feet.
51·0 gives base for comp.	... =	10647·6
D = 132° ·34′; E = 39′ ·49′; F	.. =	7° ·37′
Log. Sine F = 7° ·37′	... =	9·122362
Arith. Comp.	.. =	0·877638
Log. D E = 10647·6	... =	4·027252
Log. Sine E = 39° ·49′	.. =	9·806406
D F = 51439·5	... =	4·711296
Arith. Comp. F + Log. D E	.. =	4·901890
Log. Sine D = 132° ·34′	... =	9·867167
E F = 59164·0	... =	4·772057

For Jutur Shunkur West Peak = G

In the Triangle D E G

Base D E for computation	... =	10647·6 feet.
D = 92° ·10′; E = 78° ·17′; G	... =	9° ·33′
Log. Sine G = 9° ·33′	.. =	9·219868
Arith. Comp.	... =	0·780132
Log. D E = 10647·6	. =	4·027252
Log. Sine E = 78° ·17′	... =	9·990855
D G = 62840·4	... =	4·798239
Arith. Comp. G + Log. D E	... =	4·807384
Log. Sine D = 92° ·10′	... =	9·999689
E G = 64131·7	... =	4·807073

For Jutur Shunkur East Peak = H

IN THE TRIANGLE D E H

Base D E for computation	.. =	10647·6
D = 91° ·47′; E = 77° ·57′; H	.. =	10° ·16′
Log. Sine H = 10° ·16′	.. =	9·250980
Arith. Comp.	.. =	0·749020
Log. D E = 10647·6	. =	4·027252
Log. Sine E = 77° ·57′	.. =	9·990324
D H = 58424·7	... =	4·766596
Arith. Comp. H + Log. D E	... =	4·776272
Log. Sine D = 91° ·47′	.. =	6·999790
E H = 59712·0	... =	4·776062

For Bumgurh or Dobgurh Peak = I

IN THE TRIANGLE A E I

Calculated side A E	.. =	7625·2 feet.
51·0 base for computation	... =	7574·2
A = 89°·09′; E = 85° ·16′; I	.. =	5° ·35′
Log. Sine I = 5° ·35′	.. =	8·988083
Arith. Comp.	.. =	1·011917
Log. A E = 7574·2	... =	3·879337
Log. Sine E = 85° ·16′	... =	9·998516
A I = 77583·6	... =	4·889770
Arith. Comp. I + Log. A E	.. =	4·891254
Log. Sine A = 89° ·09′	.. =	9·999952
E I = 77840·6	.. =	4·891206

For Choura Deo Peak = J

IN THE TRIANGLE A E J.

The small Theodolite being used at A

Base A E for computation	.. =	7574·2 feet.

A = 82° ·40′; E = 89° ·12′; J	.. =	8° ·08′
Log. Sine J = 8° ·08′	.. =	9·150686
Arith. Comp.	... =	0·849314
Log. A E = 7574·2	.. =	3·879337
Log. Sine E = 89° ·12′	.. =	9·999958
A J = 53531·5	... =	4·728609
Arith. Comp. J + Log. A E	... =	4·728651
Log. Sine A = 82° ·40′	.. =	9·996433
E J = 53098·8	.. =	4·725084

For the same peak Choura Deo = J

IN THE TRIANGLE D E J

Base D E for computation	.. =	10647·6 feet.
D = 84° ·09′; E = 84° ·24′; J	... =	11° ·27′
Log. Sine J = 11° ·27′	.. =	9·297788
Arith. Comp.	.. =	0·702212
Log. D E = 10647·6	.. =	4·027252
Log. Sine E = 84° ·24′	.. =	9·997922
D J = 53381·0	... =	4·727386
Arith. Comp. = J + Log. D E	.. =	4·729464
Log. Sine D = 84° ·09′	.. =	9·997732
E J = 53357·6	... =	4·727196

For the West Hip called Kulmdhora.

IN THE TRIANGLE D E K

Calculated side A E	.. =	7625·2 feet.
51·0 = base for calculation	.. =	7574·2

A = 12° ·07′; E = 42° ·32′; K	... = 125° ·21′
Log. Sine K = 125° ·21′	.. = 9·911495
Arith. Comp.	... = 0·088505
Log. A E = 7574·2	.. = 3·879337
Log. Sine E = 42° ·32′	.. = 9·829959
A K = 6277·7	.. = 3·797801
Arith. Comp. K + Log. A E	.. = 3·967842
Log. Sine A = 12° ·07′	.. = 9·322019
E K = 1949·2	... = 3·289861

Again for the near West Hip = *K*

IN THE TRIANGLE C E K

Calculated side C E	.. = • 8823·3 by 3
51·0 = base for calculation	.. = 8772·3
C = 10° ·59′; E = 47° ·40′; K	.. = 121° ·21′
Log. Sine K = 121° ·21′	.. = 9·931461
Arith. Comp.	.. = 0·068539
Log. C E = 8772·3	.. = 3·943114
Log. Sine E = 47° ·40′	.. = 9·868785
C K = 7593·4	.. = 3·880438
Arith. Comp. K + Log. C E	.. = 4·011653
Log. Sine C = 10° ·59′	.. = 9·279948
E K = 1957·5	.. = 3·291601

Again for the near West Hip = *K*

IN THE TRIANGLE D E K

Calculated side D E	.. = 10698·6 feet.
51·0 = base for calculation	... = 10647·6
D = 7° ·28′; E = 37° ·44′; K	... = 134° ·48′
Log. Sine K = 134° ·48′	.. = 9·850996

Arith. Comp.	.. = 0·149004
Log. D E = 10647·6	. = 4·027252
Log. Sine E = 37° ·44′	.. = 9·786742
D K = 9183·3	.. = 3·962998
Arith. Comp. K + Log. D E	... = 4·176256
Log. Sine D = 7° ·28′	.. = 9·113774
E K = 1949·8	... = 3·290030
Hence E K by A E K	... = 1949·2 feet.
and by C E K	... = 1957·5
and by D E K	.. = 1949·8
Therefore by mean of 3	... 2952 2 = E K

For the Commanding Officer's Hill = *L*

In the Triangle C E L

Base for calculation C E	.. = 8772·3 feet.
C = 12° ·05′; E = 48° ·12′; L	.. = 119° ·43′
Log. Sine L = 119° ·43′	.. = 9·938764
Arith. Comp.	... = 0·061236
Log. C E = 8722·3	... = 3·943114
Log. Sine E = 48° ·12′	.. = 9·872434
C L = 7529·8	.. = 3·876784
Arith. Comp. L + Log. C E	.. = 4·004350
Log. Sine C = 12° ·05′	.. = 9·320840
E L = 2114·4	.. = 3·325190

For the Hospital Hill = *M*

In the Triangle D E M

Base for calculation D E	.. = 10647·6 feet.

D = 10°·26′; E = 79°·48′; M	... =	89°46′
Log. Sine M = 89°·46′	... =	9·999996
Arith. comp.	... =	0·000004
Log. D E = 10647·6	... =	4·027252
Log. Sine E = 79°·48	... =	9·993081
D M = 10479·4	.. =	4·020337
Arith. Comp. M + Log. D E	.. =	4·027256
Log. Sine D = 10°·26′	... =	9·257898
E M = 1928·2	... =	3·285154

For the Sanatarium Hill = N

IN THE TRIANGLE C E N

Base for calculation C E	.. =	8772·3 feet
C = 17°·36′; E = 96°·11′; N	... =	66°·13′
Log. Sine N = 66°·13′	.. =	9·961458
Arith. Comp.	... =	0·038542
Log. C E = 8772·3	.. =	3·943114
Log. Sine E = 96°·11′	.. =	9·997466
C N = 9530·6	... =	3·979122
Arith. Comp. N + Log. C E	.. =	3·981656
Log. Sine C = 17°·36′	.. =	9·480539
E N = 2898·7	... =	3·462195

Calculations of the Vertical Angles.

	Feet.		
Measured base A B	= 1282·25	.. =	3·107973
Log. Tang. El. A B A′	= 0°·27′	... =	7·895099
Appar. Diff.	± 10·071	... =	1·003072

Add Table 24	=	0·033 for Curvature, &c.			
and		4·250 for small Theod.			
Diff. of Level	=	14·354	...	=	B below A.
Also base A B	=	1282·25	..	=	3·107973
Tang. Dep. B A B′	=	0° ·29′	..	=	7·926134
Appar. Diff.	=	10·817	...	=	1·034107
Deduct Table 24	=	0·033 for Curvature, &c.			
and		4·250 for small Theod.			
Diff. of Level	=	6·531	...	=	A above B.
Do. as above	=	14·354			
Mean of 2	=	10·444	..	=	A above B.
		Feet.			
Side A C	=	1404·3	...	=	3·147464
Tang. El. C A C′	=	1° ·02′	...	=	8·256165
Appar. Diff.	=	25·330	...	=	1·403629
Add Table 24	=	0·039 for Curvature, &c.			
and		4·250 for small Theod.			
Diff of Level	=	29·619	...	=	A below C.
		Feet.			
Side B C	=	1274·4	...	=	3·105316
Tang. El. C B C′	=	1°·38′	...	=	8·455070
Appar. Diff.	=	36·340	...	=	1·560386
Add Table 24	=	0·033 for Curvature, &c.			
and		4·250 for small Theod.			

Diff. of Level	=	40·623	... =	B below C.
Deduct		10·444	.. =	B below A.
Difference	=	30·179	.. =	A below C.
Do. as above	=	29·619		
Mean of 2	=	29·899	.. =	A below C.

		Feet.		
*Side B D	=	1884·2	... =	3·275135
Tang. El. D B D′	=	5° ·20′	.. =	8·970133
Appar. Diff.	=	175·90	... =	2·245268
Add Table 24	=	0·07 for Curvature, &c.		
and		4·07 for small Theod.		
Diff. of Level	=	180·22	... =	B below D.

		Feet.		
Again, side B D	=	1884·2	... =	3·275135
Tang. Dep. B D B′	=	5° ·23′	... =	8·974209
Appar. Diff.	=	177·56	... =	2·249344
Deduct Table 24	=	0·07 for Curvature, &c.		
and		4·50 for Theod. No. 121.		
Diff. of Level	=	172·99	... =	D above B.

		Feet.		
Side C D	=	2511·3	... =	3·399896
Tang. Dep. D C D′	=	3° ·11′	... =	8·745207
Appar. Diff.	=	139·67	... =	2·145103
Deduct Table 24	=	0·12 for Curvature, &c.		
and		4·50 for large Theod.		

Diff. of Level	=	135·05	... = D above C.
Add		40·62	... = C above B.
Altitude	=	175·67	... = D above B.
Diff. as above	=	172·99	
and	=	180·22 by small Theod.	
Sum		3)528·88	
Mean of 3	=	176·29	.. = D above B.
Deduct		10·44	.. = B below A.
Diff. of Level	=	165·85	... = D above A.

N. B.—In the following calculations A E, B E, C E, and D E, have each been diminished 51·0 feet, for the position of the Theodolite near station E.

		Feet	
Base A E	=	7574·2	... = 3·879337
Tang. El. E A E′	=	1° ·13′	.. = 8·327114
Appar. Diff.	=	160·86	... = 2·206451
Add Table 24	=	1·12 for Curvature, &c.	
and		4·25 for small Theod.	
Diff. of Level	=	166·23	.. = A below E.

		Feet	
Again, base A E	=	7574·2	... = 3·879337
Tang. Dep. A E A′	=	1° ·22′	... = 8·377622
Appar. Diff.	=	180·70	... = 2·256959
Deduct Table 24	=	1·12 for Curvature, &c.	
and		4·50 for Theod. No. 121.	
Diff. of Level	=	175·08	... = E above A.

Side B E calculated at		8807·1 Feet.		
51·0	=	8756·1 Log.	.. =	3·942311
Tang. Dep. B E B′	=	1° ·25′	... =	8·393234
Appar. Diff.	=	216·55	... =	2·335545
Deduct Table 24	=	1·53 for Curvature, &c.		
and		4·50 for large Theod.		
Diff. of Level	=	210·52	.. =	E above B.
Deduct		10·44	.. =	B below A.
Difference	=	200·08	... =	E above A.
Side C E calculated at		8844·6 Feet.		
51· 0	=	8793·6 Log.	... =	3·944167
Tang. Dep. C E C′	=	1° ·02′	... =	8·256165
Appar. Diff.	=	158·61	... =	2·200332
Deduct Table 24	=	1·53 for Curvature, &c.		
and		4·50 for large Theod.		
Diff. of Level	=	152·58	.. =	E above C.
Add		29·90	... =	A below C.
Altitude	=	182·48	... =	E above A.
Side D E calculated at		10698·6 Feet.		
51· 0	=	10647·6 Log.	.. =	4·027252
Tang. El. E D E′	=	0° ·05′	... =	7·162696
Appar. Diff.	=	15·49	... =	1·189948
Add Table 24	=	2·22 for Curvature, &c.		
and		4·50 for Theod. No. 121.		

Diff. of Level	=	22·21	... =	D below E.
Add		165·85	... =	D above A.
Altitude	=	188·06	.. =	E above A.
Do. by C E	=	182·48		
Do. by B E	=	200·08		
Do. by A E	=	175·08 with large Theod.		
Do. by A E	=	166·23 with small Theod.		
Sum 5		)911·93		
Mean of 5	=	182·39	.. =	E. above A.
Deduct		165·85	... =	D above A.
Difference	=	16·54	... =	E above D.

For the Tidee Kothee Peak = F

Side D F	=	51439·5	.. =	4·711296
Tang. Dep. F D F′	=	0° ·9′	.. =	7·417970
Appar. Diff.	=	134·67	... =	2·129266
Deduct Table 24	=	52·94 for Curvature, &c.		
and		4·50 for large Theod.		
Diff. of Level	=	77·23	.. =	D above F.
Add		16·54	... =	E above D.
Altitude	=	93·77	... =	E above F.
Again, E F	=	59164·0	.. =	4·772057
Tang. Dep. F E F′	=	0° ·04′	.. =	7·065786
Appar. Diff.	=	68·84	... =	1·837843
Deduct		69·96 for Curvature, &c.		

Elevation	=	1·12		
Add		4·50 for largeTheod.		
Diff. of Level	=	5·62	.. =	E below F.
Alt. as above	=	93·77	... =	E above F.
Mean of 2	=	44·08	... =	E above F.

For the West Peak of Jutur Shunkur = G.

Side D G	=	62840·4 Log.	.. =	4·798239
Tang. El. G D G′	=	0° ·37′	.. =	8·031945
Appar. Diff.	=	676·37	.. =	2·830184
Add. Table 24	=	78·82 for Curvature, &c.		
and	=	4·50 for large Theod.		
Diff. of Level	=	759·69	.. =	D below G.
Deduct		16·54	... =	D below E.
Difference	=	743·15	... =	E below G.
Again, E G	=	64131·7	... =	4·807073
Tang. El. G E G′	=	0° ·38′	... =	8·043527
Appar. Diff.	=	708·92	... =	2·850600
Add Table 24	=	81·93 for Curvature, &c.		
and		4·50 for large Theod.		
Diff. of Level	=	795·35	.. =	E below G.
and		743·48 as above.		
Mean of 2	=	769·42	... =	E below G.

For the East Peak of Jutur Shunkur = H.

Side D H	=	58424·7 feet	.. =	4·766596
Tang. El. H D H′	=	0° ·36′	.. =	8·020045

Appar. Diff.	= 611·84	.. =	2·786641
Add Table 24	= 68·10 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 684·44	... =	D below H.
Deduct	16·54	... =	D below E.
Difference	= 667·90	.. =	E below H.
Again, E H	= 59712·0	.. =	4·776062
Tang. El. H E H′	= 0° 39′	... =	8·054809
Appar. Diff.	= 677·44	.. =	2·830871
Add Table 24	= 71·30 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 753·24	... =	E below H.
Do. as above	667·90		
Mean of 2	= 710·57	.. =	E below H.

For Bumgurh or Dobgurh = I

Side A I	= 77583·6	... =	4·889770
Tang. El. I A I′	= 0° ·35′	... =	8·007809
Appar. Diff.	= 789·91	.. =	2·897579
Add Table 24	= 120·61 for Curvature, &c.		
and	4·25 for small Theod.		
Diff. of Level	= 914·77	.. =	A below I.
Deduct	182·39	... =	A below E.
Difference	= 732·38	.. =	E below I.

Again E I	= 77840·6	... =	4·891266
Tang. El. I E I′	= 0° 32′	... =	7·968889
Appar. Diff.	= 724·60	.. =	2·860095
Add Table 24	= 120·61 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 849·71	.. =	E below I.
Do. as above	732·38		
Mean of 2	= 791·05	.. =	E below I.

For Chourcea or Choura Deo Peak = *J*

Side D J	= 53381·0	.. =	4·727386
Tang. El. J D J′	= 0° 44′	... =	8·107203
Appar. Diff.	= 683·26	.. =	2·834589
Add Table 24	= 56·93 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 744·69	... =	D below J.
Deduct	16·54	... =	D below E.
Difference	= 728·15	.. =	E below J.
Again E J	= 53357·6	.. =	4·727196
Tang. El. J E J′	= 0° 43′	... =	8·097217
Appar. Diff.	= 667·44	.. =	2·824413
Add Table 24	= 56·93 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 728·87	.. =	E below J.
Do. as above	728·15		

Mean of 2	= 728·51	... =	E below J.

For Choura Deo, 14th October 1858.

Side A J	= 53531·5	.. =	4·728609
Tang. El. J A J′	= 0° ·51′	.. =	8·171328
Appar. Diff.	= 794·21	.. =	2·899939
Add Table 24	= 56·86 for Curvature, &c.		
and	4·25 for small Theod.		
Diff. of Level	= 855·32	... =	A below J.
Again, 17th October, Log. A J		.. =	4·728609
Tang. El. J A J′	= 0° ·47′	.. =	8·135851
Appar. Diff.	= 731·92	... =	2·864460
Add Table 24	= 56·86 for Curvature, &c.		
and	4·25 for small Theod.		
Diff. of Level	= 793·03	... =	A below J.
Do. as above	855·32		
Mean J A	= 824·18 by small Theod.		
Deduct	182·39	... =	A below E.
Mean J E	= 641·79 by small Theod.		

The large Theodolite being preferable.

For the near West Hip = K

Side D K	= 9183·3 Log.	... =	3·962998
Tang. Dep. K D K′	= 0° ·17′	.. =	7·694179
Appar. Diff.	= 45·41	... =	1·657177
Deduct Table 24	± 1·69 for Curvature, &c.		
and	4·50 for large Theod.		

Diff. of Level	= 39·22	..	= D above K.
Add	16·54	..	= E above D.
Altitude	= 55·76	..	= E above K.
Again, side E K′	= 1949·8	..	= 3·290030
Tang. Dep. K E K′	= 1° ·02′	...	= 8·256165
Appar. Diff.	= 35·17	..	= 1·546195
Deduct Table 24	= 0·08 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 30·59	..	= E above K.
Do. as above	55·76		
Mean of 2	= 43·18	...	= E above K.

For the Hospital Hill = M

Side D M′	= 10479·4 Log.	..	= 4·020337
Tang. El. M D M′	= 0° ·10′	..	= 7·463727
Appar. Diff.	= 30·48	..	= 1·484064
Add Table 24	= 2·21 for Curvature, &c.		
and	4·50 for large Theod.		
Diff. of Level	= 37·19	...	= D below M.
Deduct	16·54	..	= D below E.
Difference	= 20·65	...	= E below M.
Again, side E M	= 1928·2	..	= 3·285154
Tang. El. M E M′	= 0° ·03′	...	= 6·940848
Appar. Diff.	= 1·68	..	= 0·226002

Add Table 24	=	0·07 for Curvature, &c.	
and		4·50 for large Theod.	
Diff. of Level	=	6·25	.. = E below M.
Do. as above		20·65	
Mean of 2	=	13·45	... = E below M.

For the Separate Hill = L

The spirit bubble was broken before the large Theodolite was used at ⊙ C, so that no elevation is taken on C L

Side E L	=	2114·4 Log.	... = 3·325190
Tang. El. L E L′	=	0° ·12′	... = 7·542909
Appar. Diff.	=	7·38	... = 0·868099
Add Table 24	=	0·08 for Curvature, &c.	
and		4·50 for large Theod.	
Diff. of Level	=	11·51	... = E below L.

For the Sanatarium Hill = N

Side E N	=	2898·7 Log.	... = 3·462195
Tang. El. N E N′	=	0°·05′	.. = 7·162696
Appar. Diff.	=	4·21	.. = 0·624891
Add Table 24	=	0·17 for Curvature, &c.	
and		4·50 for large Theod.	
Diff. of Level	=	8·88	.. = E below N.

		Feet.
Taking the level of Nagpore or Seetabuldee above the sea	.. =	939·0
Camp Muhtoor would be	.. =	3297·0
and ⊙ A, about 5′ higher	.. =	3302·0

⊙ B — at S. W. end of base	..	=	3291·6
⊙ C — on a low eminence	...	=	3331·9
⊙ D — on knoll near ghaut	...	=	3467·9
⊙ E — Commissioner's site	..	=	3484·4
⊙ F — Tidee Kothee Peak	..	=	3440·3
⊙ G — Jutur Shunkur	...	=	4253·7
⊙ H — Bumgurh Peak	...	=	4195·0
⊙ I — Dobgurh Peak	...	=	4275·5
⊙ J — Choureea Deo Peak	..	=	4212·9
⊙ K — Chief Engineer's site	..	=	3441·2
⊙ L — Commanding Officer's	...	=	3495·9
⊙ M — Hospital Hill	..	=	3497·9
⊙ N — Sanatarium Hill	..	=	3493·3

Instead of 3500·7 as in the report.

ENCLOSURE II.

From the Commissioner of Nagpore, to the Brigadier Commanding at Kamptee,—(No. 725, dated the 1st October 1859.)

With reference to your letter No. 104, dated the 18th of April, and my reply No. 230, dated the 19th idem, I have the honor to request that you will be good enough to inform me whether you have detailed, or when you propose to detail, a Committee of Medical Officers for the purpose of visiting the Muhtoor range of the Chindwara hills, and reporting upon its capabilities as a Sanatarium.

From the Brigadier Commanding Nagpore Force, Kamptee, to the Commissioner of Nagpore,—(No. 355 dated the 11th October 1859.)

In reply to your letter No. 725 of 1st instant, I have the honor to state, that from the information which I have received, public and private, it would appear that the Muhtoor range of hills are at this particular season most unhealthy, and that I should not consider it advisable to send a party there at present, consisting as it necessarily would, of several Europeans as well as Natives.

Mr. Superintending Surgeon Maule has laid before me copy of a letter addressed by the Apothecary at Chindwara to Lieutenant Grove,

stating that 52 men of a detachment which had lately been employed on those hills on some detachment duty, were all laid up with an intermittent fever, and that the cases were increasing. This circumstance will, I doubt not, be known to you, as also that a Havildar and a Private of Lieutenant Grove's party died of fever during the short time they were detached on those hills.

Whether those hills are safe just now, as regards the rebel Talookhdar Babboot Sing, will be best known to you from information which does not of course come to me; but unless a report be urgently and immediately required, I do think it would be advisable to defer sending out a party until more towards the end of the year.

I am sorry that the last hot weather was allowed to escape, but you are aware that reports of rebels being about in that neighbourhood, rendered it unadvisable at that season to send out a small party.

From the Commissioner of Nagpore to the Brigadier Commanding Nagpore Force, Kamptee,—(No. 754, dated the 17th October 1859.)

I have the honor to acknowledge the receipt of your letter No. 355, dated the 11th instant, and in reply to state that under the circumstances therein represented, I quite concur with you in thinking that it would be unadvisable to send a party to report on the Muhtoor range until the season is sufficiently advanced as to admit of the Jungles being traversed without risk of fever.

2. It is my intention to take an early opportunity of perusing the whole correspondence connected with the subject of the proposed Sanatarium at Muhtoor, and to communicate further with you according as may be necessary.

From the Brigadier Commanding Nagpore Force, Kamptee, to the Commissioner of Nagpore,—(No. 147, dated the 18th April 1860.)

Adverting to your letter No. 754, dated 17th October 1859, I have the honor to request that I may be informed, as soon as convenient, of your opinion regarding the proposed Sanatarium at Muhtoor.

I have lately been informed by Officers possessing information on the subject, that Muhtoor is known and proved to be a feverish locality. Should this be the case it will probably be necessary to seek for a Sanatarium elsewhere; but taking into consideration the large body of European Troops which would benefit by a Sanatarium, and also looking to the long time which has elapsed since the attention of the authorities, Civil and Military, was first directed to this important matter, I beg to suggest that a further and early consideration of it is highly desirable

From the Brigadier Commanding Nagpore Force, Kamptee, to the Commissioner of Nagpore,—(No. 150, dated the 20th April 1860.)

Proceedings of Madras Government, No. 1125, dated 22nd March 1860.
Letter from Quarter Master General, Madras Army, No. 1042, dated 11th April 1860.
} Requested to be returned.

In continuation of my letter No. 147 of yesterday, I have the honor to forward documents as per margin, received by me this morning from Madras.

I have only to observe that, in my opinion, Muhtoor, in climate, central situation, accessibility, &c., is by far the most eligible spot for selection, provided only that it be healthy.

The Chikuldah hills are equally eligible, except as to their less central situation. A necessity would exist of making a good road from Kamptee to Ellichpoor, and thence to Chikuldah,—and a certain inferiority in the supply of water, which latter want is however easily to be met by the formation of tanks on the hill.

The salubrity of the Chikuldah has long been beyond question.* Chikuldah and Seonee, do not, I consider, possess sufficient advantage in point of climate over Kamptee, to encourage any idea of forming either of them into a Sanatarium.

* Chikuldah would likewise be available to the European Troops at Jaulnah.

It might perhaps be advantageous to examine the capabilities of the "Lanjee" hills, about 90 miles north-east of Kamptee.

From Brigadier Commanding Nagpore Force, Kamptee, to the Commissioner of Nagpore,—(No. 153, dated the 21st April 1860.)

In continuation of my letter No. 150 of yesterday, I have the honor to inform you that the Superintending Surgeon of this Force appears to think lightly of the reported general unhealthiness of the Muhtoor hills, and to consider that sickness, which certainly prevailed last year among a guard of Irregular Infantry, who were on duty at Muhtoor, may be attributed to other causes than insalubrity of the hill climate.

If upon enquiry you find reason to believe that Muhtoor deserves a trial, I should be very glad to receive your answer to this, and to my two former letters on this subject, with the least practicable delay, as a Committee of Medical and Military Officers ought to proceed to Muhtoor within the next few days, if at all in the present season, in order that they may perform the duty and return to Kamptee before the rains shall have set in.

P. S.—I should wish to add to the Committee, Captain Saunders, of the 7th Native Infantry now at Kamptee; but as this Officer is still on the roll of the Department Public Works, I do not consider that he is at present under my immediate orders.

From the Commissioner of Nagpore to the Brigadier Commanding Nagpore Force, Kamptee,—(No. 160, dated the 23rd April 1860.)

No. 147, dated 18th April 1860.
„ 150, dated 20th „ „
Major Scott, Officiating Quarter Master General.
To Officer Commanding Nagpore Force, No. 1092, dated 11th April 1860.
Proceedings of Madras Government in Military Department, No. 1125, dated 22nd March 1860, held on letter from Supreme Government of India, 952A, dated 16th February 1860.
Brigadier Carthew to Major Elliot Commissioner of Nagpore, No. 153, dated 21st April 1860.

I have the honor to acknowledge the receipt of your letters, with enclosures, as noted in the margin, having reference to the proposed Sanatarium at Muhtoor, and in reply I have to communicate as follows:—

Within the last few days, a copy of the letter No. 952A, addressed by the Supreme Government to the authorities of Fort St. George, under date the 16th of February last, has reached this office from the Military Department, Fort William; and yesterday, I received from Calcutta some copies of

the papers alluded to in paras. 11 and 12 of that communication; one copy of these papers is herewith sent for your perusal.

2. I have never visited either Muhtoor or Chikuldah, the only two spots in the country likely to answer the purpose of a Sanatarium in this part of India; but from what I have heard, I am of opinion that Muhtoor should not be finally condemned without some further enquiry being instituted.

3. It is so eligibly situated, both in regard to distance and accessibility, that too hasty conclusions ought not to be drawn from last years' sickness, which may possibly be found to have arisen from causes quite distinct from the climate of Muhtoor itself. At certain seasons of the year, in this part of the country, fever prevails to a considerable extent, more especially in wooded tracts or in the neighbourhood of low jungle or brushwood; but very often the adoption of remedial measures suggested by the features of the locality tend to lessen greatly, if not entirely to remove the sickness.

4. In this view of the case, I concur with you in thinking it very desirable that measures should be taken for having Muhtoor very carefully examined and reported on by a competent Committee of Officers; and the present season of the year is, probably, all things considered, the very best for the purpose. Some six or seven weeks must elapse in all likelihood before the monsoon sets in, during which period much valuable information might be collected.

5. Failing Muhtoor, the Chikuldah can always be made available: the capabilities of which place are sufficiently well known. There would be no difficulty in having a good road made from Kamptee, should it be deemed necessary; but whether it would be as easy to remedy the deficiency in the supply of water, I am unable to say.

6. The Deputy Commissioner of Chindwara will be furnished with a copy of this letter, and requested to afford such aid to the Officers of the Committee, in the prosecution of their enquiries, as may be in his power.

7. The services of Captain Saunders, of the 7th Regiment, for this, or for any other duty, are entirely at your disposal.

His presence on this occasion would, I think, be very advantageous, as he is well acquainted with that part of the country; and his practical knowledge as an Engineer might be turned to useful account.

8. The enclosures received with your letter No. 150, under date the 20th April, are returned herewith as requested.

From the Commissioner of Nagpore to the Deputy Commissioner Chindwara, —(No. 302, dated the 23rd April 1860.)

In transmitting for your information, copies of the papers noted in the margin, I have the honor to annex a copy of a letter under this day's date, No. 160, addressed to the Brigadier commanding at Kamptee, and with reference thereto I have to request that you will afford every information and aid in your power to the Committee of Officers about to be appointed by Brigadier Carthew for the purpose of proceeding to, and reporting upon, the capabilities of Muhtoor as a Military Sanatarium.

Secretary to Government of India, in the Military Department, to Commissioner of Nagpore, No. 80C, dated 3rd April 1860.
Secretary to Government of India, in the Military Department, to Secretary to Government, Fort St. George, Military Department, No. 952A, dated 16th February 1860.

From the Brigadier Commanding Nagpore Force, Kamptee, to the Commissioner of Nagpore,—(No. 230, dated the 7th August 1860.)

By the accompanying copy of letter from Quarter Master General, Madras Army, No. 2019, you will perceive that His Excellency the Commander-in-Chief has recommended temporary accommodation for 30 or 40 Soldiers, with officers and followers, to be erected at Muhtoor early in next year.

With reference to this recommendation, I have the honor to express my hope that whatever accommodation may be ordered to be provided, it may be of a sufficiently substantial nature to form a part of the buildings which may be eventually sanctioned, should the first trial of the Sanatarium prove satisfactory.

The true copy also, accompanying, of my answer to the letter above quoted, will sufficiently explain my reasons for holding the opinion which I have on this very important subject.

From the Acting Quarter Master General of the Madras Army, to the Officer Commanding Nagpore Force, Kamptee,—(No, 2019, dated the 26th July 1860.)

I have the honor by order of His Excellency the Commander-in-Chief, to acknowledge receipt of the report of the Committee, on the subject of the site for a Sanatarium at Muhtoor, forwarded in your letter

dated 25th June last, No. 191; and I am desired to say that the entire correspondence has been forwarded to Government with His Excellency's recommendation, that measures be taken early next year for the erection of temporary quarters for 30 or 40 sick Europeans, together with officers and followers, so as to be ready for occupation before the hot weather sets in.

From the Assistant Quarter Master General, Nagpore Force, Kamptee, to the Quarter Master General of the Madras Army,—(No. 229, dated the 7th August 1860.)

In acknowledging your letter of the 26th ultimo, number and subject as per margin, I have the honor to submit for consideration of His Excellency the Commander-in-Chief my opinion, that in providing accommodation at Muhtoor for 30 or 40 sick Europeans, &c., the buildings should not be temporary, but so constructed as to form a part of the future permanent accommodation, should the trial of the Sanatarium prove favorable.

No. 2019 states that the entire correspondence on the subject of the Muhtoor Sanatarium has been forwarded to Government, with His Excellency the Commander-in-Chief's recommendation, that temporary quarters be erected early in next year for 30 or 40 sick Europeans with officers and followers.

In support of this opinion, I beg to adduce the following reasons, *viz.*, that a fair trial of the Sanatarium can scarcely be had unless the men are well housed; that the advantage of the lower temperature of the hills, as compared with the low country, will be greatly lessened, unless the buildings be of solid construction, well raised from the ground with boarded floors, lofty and well ventilated, and in fine equal in all respects to those allowed at the present day to European Troops in India.

The expense of such buildings would doubtless be somewhat heavy, still considering the importance of the experiment, as regards the health of the large number of British Soldiers stationed within reach of the Muhtoor hills, I cannot but think that it will be wise to make this outlay, in order to ensure, as far as possible, the success of the Sanatarium.

By the erection of temporary buildings a certain loss of money is incurred, whether the Sanatarium be established or not, whereas, should the advantages of the locality prove to be as great as on the report of the Committee they may be expected to be, no loss whatever would ensure from the erection of the substantial quarters now advocated as a part of the accommodation which would hereafter be required.

Should the present expression of my opinion on this matter meet with the concurrence of His Excellency and of Government, I would strongly recommend that the necessary authority be given through the proper channel to the local Government, in such time as to ensure the Engineer Department being put in a position to commence proceedings in November next at latest.

ENCLOSURE III.

From Brigadier M. CARTHEW, Commanding Nagpore Force, to Major E. K. ELLIOT, Commissioner of Nagpore,—(No. 188, dated Kamptee, the 21st June 1860,)

I HAVE the honor to forward to you a duplicate of proceedings of the Committee lately employed at the proposed Sanatarium of Muhtoor, in the district of Chindwara.

Both, the duplicate proceedings and accompanying copies of plans, &c., are very roughly made out; but as the subject has been so long pending, and its disposal at as early a date as possible much to be desired, I send these documents to you at once in their present state, as forwarded by the Committee, in preference to encountering the delay which would necessarily arise from having fair copies made at Kamptee.

The original proceedings, plans, &c., will, within the next three or four days, be forwarded to Army Head Quarters at Madras, for transmission to Government.

I consider the report to be satisfactory as regards the advantages of the Muhtoor plateau as a Sanatarium; and I hope that the next working season, after the present rains, may be taken advantage of to give effect to the suggestions of the Committee for testing the climate in the hot season of 1861—*vide* para. 52 (summary) of the report.

The Committee were not instructed to prepare estimates or to suggest expenditure; but as plans and estimates for public buildings, roads, &c., have been sent in, they may be permitted to accompany the proceedings, and taken for what they are worth.

It appears to me that a small amount of expenditure to be available, immediately on the cessation of the rains, especially for the digging of wells, and for storing water at one or two eligible spots near the village of Dugurrea, should be sanctioned; also that the favourable opinion of Government be obtained in time that comfortable barrack

and hospital accommodation for 30 or 40 men should be provided by the end of February 1861.

It is highly desirable to turn the track of the Mahadeo pilgrims to a greater distance from Muhtoor* if possible. With this view I have written to the Deputy Commissioner of Chindwara for information as to the stated necessity for the pilgrims to visit the summit of the Muhtoor Ghaut itself, and the result of which reference, I shall communicate to you when received.

Referring to para. 40 of the report, I am of opinion that the barracks and hospital should be not less than 100 yards in distance from the crest of the hill. If so near as 150 feet, the distance proposed by the Committee, not only would the buildings be very imperfectly sheltered from the strong winds which blow from the valley of the Dainwah, but also such proximity to the sheer precipice which forms the crest of the mountain, would be dangerous at night to men who might stroll out of barracks.

Report of a Committee of Officers appointed by Brigadier M. Carthew, Commanding the Nagpore Force, to examine a proposed site for a Sanatarium on the Muhtoor Hills,—(dated Chindwara, the 16th June 1860.)

PRESIDENT:

Major Wm. J. L. PATTERSON, *Her Majesty's* 91*st Regiment.*

MEMBERS:

Captain E. F. BURTON, *Assistant Quarter Master General, Nagpore Force.*

Captain E. A. SAUNDERS, *Ex. Engr., Nag. Province.*

Assistant Surgeon, R. WATSON, *Her Majesty's* 91*st Regiment.*

J. T. MAULE, Esq., *Deputy Inspector General, in attendance for the purpose of aiding the Committee with his advice and suggestions.*

Her Majesty's 91*st Regiment.*
Corporal 1,——Privates 6.
Nagpore Irregular Infantry.
Naique 1——Privates 6.
Mootkee Horse &c.
Fifteen.

THE Committee having assembled, according to order, at the beginning of May at Chindwara, were joined there by the small Force detailed in the margin, and marched on the 7th to Oomrait, 15 miles; on 8th to Jambai, 10 miles; and on the 9th about 10 miles

further to the spot, (2 miles north-west from the village of Muhtoor) which has been already partially reported on by the Chief Engineer, and at which some temporary huts have been erected.

2. It is shewn in the accompanying sketch plan (No. 2), and is situated on the northern verge of what has been generally called the Muhtoor plateau, an elevated Table Land of the Vindhya range of mountains of considerable length, and having an average breadth of from 6 to 7 miles.

Sanatarium site.

3. The ground shewn in the plan, which will be referred to in this report as the "Sanatarium site", may be described as a small sloping plateau or shallow valley of 1½ by ¾ miles in extent; its general direction and slope being from west to east.

4. It lies in 22° 13′ north latitude and 78° 40′ east longtitude, and has a general elevation of 3,400 feet above the level of the sea.

5. Along its southern side there runs a steep narrow ridge of hills which is probably the highest ground on the range, and rises from 80 to 120 feet above the lowest portion of the "Sanatarium site."

6. On its northern verge the ground rises in a gentle slope to the crest of the mountain, from whence there is a rapid and precipitous descent of 1,200 to 1,400 feet into the valley of the Dainwah, some 8 or 10 miles in breadth, which separates this range from the Mahadeo and Puchmurry clump.

Valley of the Dainwah.

7. This valley which stretches for many miles both eastward and westward, presents an undulating, somewhat hilly surface, covered with loose jungle, and having forests of Saj and Teak in the ravines, and bamboos on the slopes. It is intersected by numerous stream beds, tributaries of the Dainwah, which falls into the Nerbudda, and through these the surface drainage would appear to be both rapid and complete. There is little or no appearance of flat low-lying ground, nor of any thing that could pass into a state of marsh during the wet season.

Scenery.

8. The view from the northern crest of the Muhtoor range across this deep and widely stretching wooded valley to the high pile of hills beyond that rise abruptly in rocky precipices like vast fortress walls crowned by the twin rounded peaks of

Mahadeo, is one of great beauty and grandeur, and such as could not fail to impress agreeably and invigorate the mind wearied by the monotony of the scorched plains of Nagpore and Central India.

Surrounding country.

9. The country surrounding the "Sanatarium site" on other sides, that is on the Muhtoor plateau itself, is of pretty uniform character: ridges and hills descending into ravines, or more ample valleys interspersed with patches of cultivation, and a few poor villages.

10. There is no appearance of marshy ground, the surface being well drained by the "Pench" and its tributaries, which flow down the southern face of the range, and some of which offer great facilities for forming tanks. The jungle is nowhere dense, and the low vegetation is annually burnt by the villagers. A few miles to the eastward are many beautifully wooded slopes forming scenery quite park-like in its character.

11. The Committee have examined this country for several miles in each direction, and have not found any spot offering advantages equal to those of the "Sanatarium site" for building.

GEOLOGY.

Geology

12. The geological structure of these hills presents a thick capping of trap rock, resting upon the sandstone which forms the basis rock of the Vindhya range of mountains. On the Muhtoor plateau this layer of trap may be about 300 feet in thickness, though broken masses and boulders have covered the sandstone to a much lower level on the steep descent into the valley of the Dainwah. Agates, jaspers, white cornelian, and rock crystals abound in this rock. The mass of sandstone is of immense thickness, and in nearly horizontal strata. In the Dainwah valley, the eminences are also of sandstone of various characters, from a coarse gritty rock to a fine workable stone; and in strata inclined at a considerable angle, dipping south-east.

13. On the banks of the Dainwah, at points 1,600 feet lower than the Sanatarium plateau, thick beds of coal shales, rich in carbonaceous matter, and with fossil leafy impressions, together with clay slate, are found under the sandstone rock.

14. No pure coal was found in these strata, but one or two rolled masses of coaly matter were pricked up in the river bed, and it is scarcely to be doubted that seams of coal could be met with somewhat lower in the formation than this shale exposed on the banks.

15. Near Oomrait on the other side of the range coal has been found. Nodular masses of limestone are abundant on the surface near Jambai.

Soil.

16. There are two kinds of soil on the Sanatarium plateau, a black earth similar to the cotton soil of the lower country, and a brownish loose earthy soil. It varies in depth, but is usually 3 or 4 feet in the middle of the plateau, and rests on a thick bed of disintegrated trap, or at some places on a layer of earth filled with small nodules of "kunkur." It has been very little cultivated, and only in fields growing a small inferior grain; but it appears perfectly adapted for vegetable gardens, or the higher purposes of cultivation. Climate and other circumstances considered, the vine might be expected to do well on these hills.

BOTANY.

Botany.

17. The characters of the bushy and larger vegetation on the Muhtoor plateau are very similar to those of the lower country. Few plants were to be found, from which to judge of the *flora* of the locality, partly because the season of the year was not suitable, but mostly because the grass and low vegetation—a few spots excepted—had been recently burnt. The wild plantain, a fine variety of *orchis*, and some small plants of the family *Labiatie* which were noticed, speak however of a climate more genial than that of the plains. No ferns were observed on the plateau, but on the banks of the Dainwah 1,600 feet lower, they thickly fringed the stream.

WATER.

Water.

18. At this season there is no running water on the "Sanatarium site"; but by sinking wells to the depth of 5 or 6 feet in the nalah beds, or to a corresponding depth at other parts of the plateau, an apparently ample supply was obtained.

19. Independently of this abundance of surface water during the driest part of the year, the nalahs offer great facilities at many points, for storing water by means of annicuts of greater or less dimensions.

20. The water obtained from the wells which were sunk, is clear, of good taste, and apparently a pure and good potable water. *Chemical analysis*, carried as far as the means at disposal allowed, shewed that it contained a remarkably small quantity of saline matters in solution, a faint trace of chlorides, probably sodium and calciam, and a larger though by no means unusual proportion of carbonate of lime—no sulphates.

METEOROLOGY—CLIMATE.

Climate &c.

21. During the stay of the Committee on the hills, a period of 22 days in May, the hottest season of the year, the weather was, in the first two weeks, cool and fresh in the early morning, moderately warm during the day, pleasant in the evening, and cool at night. The change to the sensations of Chindwara men was remarkable: the air felt fresh and was not at any part of the day oppressively hot even in tents. About the end of May, 2 or 3 days were hot under the imperfect shelter of the hut and tents. During the night a cool breeze from the westward usually prevailed, and the temperature was pleasant, a point of much importance to invalid men, as ensuring that refreshing sleep which the heat of the night in the lower country so frequently interferes with.

Temperature.

22. The *maximum temperature* noted on a thermometer kept in a thatched hut of "wattle and dab" open to the winds, and its walls protected from the sun's rays by thatched verandahs, was 97°, but this occurred only on one day—the minimum indication was 71°.

23. The mean temperature from sunrise to sunset in the period during which observations were carried on, was 87°; from sunset to sunrise 78½°, the average daily temperature, a little under 83°.

Winds.

24. The *prevalent winds* were from the points north to west—north-west being the most common—occasional warm gusts occurred in the forenoon, during the latter half of the period; but in the evening and at night, the breeze was throughout agreeably cool.

25. The *greatest range* of the thermometer in 24 hours was 22°, the slightest 11½°, and the mean of all the period 16°. The breeze during the lowest degree of temperature, moderate.

Hygrometer.

26. The *Hygrometer* shewed an average depression of 19° on the wet bulb instrument. The average depression at Kamptee in the same period was 16°.

27. Observations carefully conducted simultaneously at Kamptee and at the Sanatarium camp, shewed that there was a difference of 11°5' in the mean temperature of the two places; but it must be remarked that the observations were only from 5 A. M. to 8 P. M., and had the night temperature been also compared it may be surmised that Muhtoor would have been found to be considerably more than 11½° cooler than Kamptee. The thermometrical observations are given in detail in Appendix I.

Barometer.

28. The indications of an Aneroid barometer were maximum 26·45 inches, medium 26·313 inches, minimum 26·2 inches; the last before a thunderstorm.

29. Very little could be ascertained regarding the climate in the rains and cold weather. The villagers report that dense fogs are very prevalent during the monsoon, and they speak of "white frost" occurring at times in the cold weather.

GENERAL SANITARY CONSIDERATIONS.

Sanatory considerations.

30. From the appearance of the Muhtoor plateau and the country about, it is not much to be dreaded that malarious on other influences obnoxious to health would arise at any season to interfere with the good effects of the place as a Sanatarium, but it would be more satisfactory in resolving this point, were some observations made for a short period after the cessation of the rains, previous to deciding on the locality as a place suitable for weakly European Soldiers at all seasons.

31. It might be surmised that the extensive valley of the Dainwah covered with vegetation would produce malaria to be wafted upward by the prevailing winds to the "Sanatarium site;" but there are several

causes in operation calculated to obviate this; 1st, the rapid drainage of the surface from its natural conformation; 2nd, by the tall forest trees which would tend to intercept any miasm generated below; and 3rdly, the annual burning of the grass, low vegetation, and dead leaves, previous to the setting in of the rains. The last point may be looked upon as a material safeguard against the production of malaria. As previously stated, there does not appear to be any marshy ground in the Dainwah valley, and there certainly is none on the Muhtoor plateau.

Inhabitants.

32. The Ghond inhabitants, who live in small scattered villages, of huts constructed from bamboo matting and thatch, are not as a rule, a robust race, but they appear to be healthy enough, and do not present any signs of splenic enlargement or other evidences of an existing endemic fever. Their principal article for food is an inferior grain of small size which they make into cakes, and occasionally boiled gram. They rarely eat animal food, and that only of the pig. At certain seasons they grow the pumpkin and other vegetables.

33. Most villages have a spirit shop in which the spirit distilled from the Mahooa is procured; but the people do not seem to be intemperate in their habits. Their spare diet would account for being under the average development,—they measure 28 to 30 inches round the chest. They state that they are subject to very few diseases: a few slight cases of fever and rheumatism occur during the rains, and at times small pox and cholera, but the two latter have usually been traced to communication with the pilgrims returning from the Mahadeo cave; and it would be highly requisite if the locality were fixed upon as a Sanatarium, that the ordinary trade of these pilgrims should be diverted from the Muhtoor Ghaut to one at a greater distance. The villagers both on the plateau and in the Dainwah valley speak of themselves as a very healthy people, but growing old early.

34. In 1859, several detachments of Native Infantry were stationed at different parts of the Muhtoor Table Land: one detachment (31 of all ranks) first at the village of Muhtoor, and then for a longer period at Dugurrea, (on the "Sanatarium site") was perfectly healthy from the beginning of January till the middle of May. They were relieved by a party of only 12 men, and amongst these remittent fever

occurred; but they were imperfectly sheltered from the weather, had very indifferent supplies, were believed to have used bad water, and were under depressing moral influences, as a body of the enemy was supposed to be at no great distance. In May 1860, the same time of year at which this small party was attacked with fever, the number of Europeans and natives in all was 250, in the camp very near Dugurrea; and with the exception of one or two trivial cases of fever, and one of rheumatism among the native followers, the most perfect health prevailed. The European Soldiers, 7 in number, in a common tent, felt the change from Chindwara even, as pleasant and invigorating.

35. In November and December 1859, a detachment of Native Infantry, numbering 28, stationed at the village of Muhtoor, is stated to have suffered from fever, and furnished six cases of intermittent fever and rheumatism to the hospital at Chindwara. Nothing is known by the Committee regarding the circumstances in which they were placed; but such an occurrence would support the previously given opinion, that it would be advisable to have some further observations carried on for a short time after the rains.

Sanatory considerations.
Classification of diseases.

36. There can be little doubt that the climate of the Muhtoor hills during the hot season, would be highly beneficial to weakly European Soldiers who have suffered from frequent attacks of fever in the low country, and to weakly young Soldiers who have just arrived in India, and who are likely to suffer from the extensive heat of the plains. Men also slowly recovering from a state of debility after acute organic disease of any kind, unless, probably, disease of the heart, are much more likely to recover their ordinary state of health on these hills than in the lower country: cases of syphilitic cachenia might also be expected to derive benefit from change.

37. In cases of rheumatism or of organic disease of the liver, lungs, and heart, of long standing, it is to be questioned if much ultimate benefit would accure to the invalids; as, though they might pass through the hot season with less exhaustion to the system, and no increase to the disease, they could not well be moved down to the plains at the end of the hot season, or commencement of the rains: and at the latter period great alterations of temperature occur, which would be

injurious to them. Under the same head might be included men who have suffered from frequent and serious attacks of dysentery.

38. It is possible that on trial, the Muhtoor Sanatarium might bear a comparison with Ramandroog, which is about the same height above the level of the sea, and has been found one of the most useful Sanataria for invalids, generally, in all India.

SITES FOR BUILDINGS.

Sites for buildings.

39. In plan No. 2 there are indicated sites which appear suitable for every description of building required for a Sanatarium, calculated to accommodate 240 invalids. Good sites for private houses can be found in several directions.

40. Barracks placed, as indicated, 150 feet from the extreme edge of the precipitous valley, would be in a degree sheltered from the violent winds of the monsoon season, without being deprived of the benefit of the more moderate and pleasant breezes of the hot weather.

41. It has been proposed to build on the summit of the "south-west ridge," but this position is bleak and exposed, and the access to it must necessarily be steep (or long) enough to prevent many a weakly man from seeking recreation on the lower ground, by the thought that he will have a stiff hill to ascend on his return. The gain in actual altitude over the site indicated, is not more than 70 or 80 feet.

42. Plans and estimates for barracks and accompanying buildings, are subjoined in Appendix II.

43. Building materials are plentiful and close at hand, as shewn more fully in the same Appendix.

AMUSEMENTS AND EXERCISE.

Amusements.

44. The nature of the country immediately around the "Sanatarium site" is such as to encourage walking and excursions in almost every direction. Game is at present abundant

on the plateau, and the steep hill sides harbour great numbers of bears. Tigers and leopards are occasionally met with, and the Committee saw (during their stay) sambur, neelghau, ravine-deer, hyenas, jackalls, hares jerboa-rats, peafowl, junglefowl, spurfowl, painted partridges, and quail.

45. In addition to the small tanks which might be formed at several points by damming up the nalahs, it appears to the Committee that a considerable sheet of water might be obtained, at no unreasonable cost, by the construction of an annicut at A in the plan. Such a piece of water would afford abundant means of recreation in boating and fishing. The space between the site indicated for barracks, and the "south-west ridge," has level spots adapted for parade ground and cricket ground, and there seems reason to believe (as stated in para. 16) that gardening could be successfully carried on.

COMMUNICATIONS.

Communications.

46. The sketch map (No. 1) shows that the distance of the "Sanatarium site" from the principal surrounding stations may be approximately estimated as follows:—

	Miles.	
From Kamptee viâ Talao and Oomrait	105	
,, Seetabuldee ditto ditto	105	
,, Chindwara viâ Oomrait	35	
,, Baitool (route uncertain) about	60	
,, Hoshungabad by rail to Bunkeree 50 miles, thence to Sanatarium about	40	
,, Nursingpore by rail to Bunkeree 48, and thence about	40	
,, Saugor by district road to Nursingpore 90, by rail to Bunkeree and by road to Sanatarium	40	130
,, Jubbulpore by rail to Bunkeree 96, and thence to Sanatarium	40	

47. In order to place the "Sanatarium site" in direct communication with all these stations, it would therefore be necessary to construct new roads only;—1st from Sanatarium to Talao where it would join the existing district road from Nagpore and Kamptee—47 miles; 2nd from Sanatarium to Bunkeree, meeting there the Hoshungabad and Nursingpore road, and also the railway—about 40 miles.

48. It may however be remarked that the road from Chindwara is already practicable for wheeled conveyances, the ghaut at Jambai not being much more difficult than that on the district road at Talao.

49. Rest houses or small staging barracks might be placed with advantage to invalids proceeding to the hills, at Talao and at Bunkeree.

50. Approximate estimates for these works are annexed in Appendix III.

The Mahadeo pilgrims.

51. A matter that has been slightly touched upon in this report (at para. 33) appears to demand some further notice. The Mahadeo cave is resorted to by vast numbers of Hindoo pilgrims at the Sheboratree festival in February, and usually by smaller numbers during the months of August and November. Those approaching from the south, go by way of Jambai and Gorukh (some miles west from Muhtoor) and return by the Muhtoor Ghaut, which ascends the Muhtoor plateau two miles to the westward of the "Sanatarium site." In February last cholera broke out among the crowds assembled in the valley below the Mahadeo peak. The wretched pilgrims fled in consternation, and left the road across the Dainwah valley, and even up the ghaut, strewed with their dead, whose half buried remains were still to be seen in great numbers last month. Such a calamity is doubtless a rare and exceptional occurrence; but if it were not possible to change the line of the pilgrims route—and this hardly seems probable—as the Committee are informed that the summit of the Muhtoor Ghaut is itself a place of veneration to them, it would appear very requisite that some measures skould be taken to prevent the spread of disease, which seems so frequently to accrue on the crowding together of large numbers of natives.

SUMMARY.

Summary.

52. From all the above data the Committee are of opinion that the proposed site offers very considerable advantages during several months of the year, as a station for invalids.

1*st.*—From its climate and general sanatory conditions.

2*ndly.*—From its agreeable situation and surrounding scenery, and

3*rdly.*—From its accessibility, especially in the direction of Nagpore.

The only point on which the Committee has a doubt as to the probable salubrity of the Muhtoor plateau at all seasons, is as regards its condition immediately after the cessation of the rains, and they would therefore recommend that further observations be made during that period. They would also suggest that arrangements be made for the accommodation of 30 to 40 selected invalids during the hot months of next year, being confident that such men would be benefited by a residence at that time on the spot they have described.

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Appendix I. Meteorological Tables at Kamptee and Muhtoor, and explanatory memorandum.

Appendix II. Estimates for buildings, &c., &c.

Do. III. Estimates for roads, and all works connected with proposed Sanatarium.

APPENDIX I.

Register of Temperature taken from two Thermometers suspended in a European Tent pitched in the plain during the month of May 1860.

Month and date.	Temperature at 5 A. M.		Temperature at 8 A. M.		Temperature at noon.		Temperature at 4 P. M.		Temperature at 8 P. M.	
May 1860.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.
1st	80	80	93	93	110	111	112	112½	99	98
2nd	80	80	91	91	109	110	109	109	96	96
3rd	82	82	96½	97	110	109	109	110	96½	96½
4th	81	81	95½	95	108	107½	110	110	96	97
5th	82	82	94½	95	109	110	111	111	97	98
6th	85	86	96	96	108	108	111	110	95	96
7th	81	81	97	97½	108	109	112	111	96	96
8th	82	82	96	96	109½	110	112	111	98	97½
9th	85	85	98	98	109	110	112	111	95	96
10th	89	90	94	94½	100	100½	111	110	94	93½
11th	81	80	96	96½	108	107½	105	105	93	93
12th	78	78	94½	95	106	106½	108	108	94	93
13th	77	76	95	96	107	106½	107	103	96	95½
14th	86	86	95	96	105½	105½	103	102	94	94
15th	84	84	92	92	98	97½	104	103	94½	94
16th	85	84	93	92	99	98	101½	104	94	93½
17th	84½	85	92½	92	105	104	104	104	93	92
18th	82	82	96	96	105	104	104	104	84	84
19th	78	78	84½	84½	101	101	105	106	90	89
20th	81½	82	88	88	104½	105	110	109	99	98
21st	82	81	94	94	106	105	109	108	97	98
22nd	85	84	97½	98	108	108	109	108	96	97
23rd	73	77	94	94½	108	107	110	110	94	93½
24th	80	79	93	92½	109	110	111	110½	98	97
25th	84	84	97	97	109	110	106½	107	99	98½
26th	90	90	94	95	108	107	96	96	93	94
27th	83	83	92	91	110	111	108	107	96	96
28th	85	85	96	96	112	111	110	109	99	100
29th	86	86	98	99	110	111	112	111½	99	98½
30th	88	88	97	98	112	112	114½	114½	99	98½
31st	83	88	98½	98	111	110	112	111	97	96

KAMPTEE, *The* 1*st June* 1860.

(Signed) F. KENNEDY,
Sarg., Arty. Nagpore Forc

Meteorological Observations on the Muhtoor

Date 1860.	Thermometer. In Regulation European Tent. 5 A. M.	8 A. M.	Noon.	4 P. M.	8 P. M.	In hut with thatched roof. Mean temperature of day.	Mean temperature of night.	Mean of 24 hours.	Daily Range.	Average depression of wet bulb.
May 10th ..	76	80½	89	93	86	86	78	82	15	21
,, 11th ...	77½	84	92½	91½	84½	86	80	83	13·5	23
,, 12th ...	76½	84	92	91	84	86	79	82·5	14·3	23
,, 13th ...	76	83	92	91	84	87	77	82	17·5	23
,, 14th ...	76	81	92	88	84	86	80	83	11·5	23
,, 15th ...	76	81	86½	92	84	84	79	81·5	12·5	16
,, 16th ...	71	79½	86	92	84	85	78	81·5	17·5	16
,, 17th ...	71	79	88	90	84	85·5	74·5	80	18	14
,, 18th ...	75	81	88	88	74	79·5	76	77·7	11·5	26
,, 19th ...	75	76½	92	94	84	86	74·3	80	16	17
,, 20th ...	75	87	92	93	84	87·7	79·5	83·6	15·5	21
,, 21st ...	79	84	91	87	84	86	79	82·5	14	27
,, 22nd ...	78	87	92	94	84	86·4	77	81·7	17	19
,, 23rd ...	75	87	95	96	84	90	78·2	84·1	21	24
,, 24th ...	79	85	95	97½	84	91	77	84	20	20
,, 25th ...	80	84	95	96	84	90	81·5	85·7	17	25
,, 26th ...	78	82	94	88	77	86	81·5	83·7	14	24
,, 27th ...	78	85	95	95	84	90	76·6	83·3	22	18
,, 28th ...	80	87	96	98½	84	89	81·3	85·1	17	13
,, 29th ...	80	85	96½	96	86	91·2	82	86·6	17	13
,, 30th ...	79	85	96½	97	85	89·8	82	85·9	18·5	13
,, 31st ...	77	83	95	91	85	89	80	84·5	18	16
Mean of 22 days at Muhtoor ...	76·7	83·2	92·3	92·6	83·5	87·1	78·7	82·9	16·3	19·3
Mean of 22 days at Kamptee ...	83·2	94·2	106·3	107·2	95					
Difference *	6·5	11	14	14·6	11·5					

* By the mean of all the comparative observations, the daily temperature at Muhtoor

Hills, from 10*th to* 31*st May* 1860.

WINDS.			WEATHER.			
1st part from 4 A. M. to 10 A. M.	2nd part from 10 A. M. to 6 P. M.	3rd part from 6 P. M. to midnight.	Morning.	Mid-day.	Evening.	Night.
W. moderate ...	N. N. W....	W. cool ...	Hazy with clouds ...	Overcast, warm ...	Clear, pleasant	Moderately cool.
W. do.	N. W. cool.	W. Do.	Clear ...	Occasional clouds ...	Do.	Do.
W. N. W. cool. ...	N. W. ...	Calm ...	Clear ...	Bright, warmer ...	A few clouds, pleasant ...	Cool.
N. by E. moderate.	N. W. strong ...	Calm & light air N. E.	Clear, fresh	Clear, warm.	Pleasant ...	Cloudy.
N. W. light.	N. mod. ...	Calm S. W. mod. ...	Cloudy ...	Overcast, cool ...	Cloudy ...	Cloudy, cool.
N. by W. moderate.	N. W. steady ..	Calm & W. N. W. ...	Cloudy and cool ...	Slight *rain*.	Clearer ...	Clear & cool.
W. N. W. very cool.	N. W. strong ...	Calm & W. cool ...	Clear, fresh	Clear, rather warm ...	Clear, pleasant ...	Do do.
N. W. light.	N. strong...	Do.	Bri't, fresh.	Cloudy	Clearer ...	Clear
Northerly...	N. variable.	S. W. ...	Clear ...	Cloudy, sultry ...	Heavy dust, storm & *rain*	Do.
West. ...	North ...	Calm ...	Light clouds	Cloudy ...	Light clouds	Do.
N. W. ...	Do.	N. W. ...	Clear ...	Clear and warm ...	Heavy clouds ...	Cloudy.
N. E. ...	N. mod. ...	Calm, variable ..	Clear & cool	Cloudy ...	Clear, pleast.	Clear, cool.
N. E. light.	N. warm...	N. to W. ..	Clear ...	Clear, very warm ...	Warm ...	Very cool.
N. W. light	N. to E. hot gusts ...	N. W. coo	Clear ...	A few clouds, hotter ...	Pleasant ...	Cool.
N. W. ...	N. changing to S. E. after	W. light ..	Cloudy ...	Bright and hot ...	Clouds, pleasant.	Warmer.
W. squally.	N. hot gusts.	N. N. W. ...	Some clouds	Clear & hot.	Cloudy, pleasant	Do.
N. W. strong ...	N. W. ...	Light & variable ..	Cloudy ...	Clearer, not so hot ...	Thunder, *heavy shower*	Cool, cloudy.
W. strong.	North ...	Calm, variable ...	Clear ...	Hazy and cloudy ...	Cloudy, warm ...	Not so cool.
N. W. light.	N. W. & N. by E. squally	W. N. W..	Do	Heavy clouds ...	Cloudy ...	Do.
N. N. W....	N. W. hot gusts ...	N. W. ..	Do	A few clouds, very hot	Hazy, warm	Cooler breeze.
W. N. W...	N. mod. W. to N. hot gusts ...	N. W. light.	Clear, cool wind ...	Hazy, warm	Warm ...	Cool breeze.
W. N. W...	N. N. W....	W. N. W...	Clear, pleasant ...	Some clouds, cool breeze	Cloudy ...	Do.

is $11\frac{1}{2}°$ lower than that of Kamptee.

(Signed) R. WATSON,
Asst. Surg. H. M.'s 91st Regt.

EXPLANATORY MEMORANDUM TO ACCOMPANY THE METEOROLOGICAL SHEET.

Thermometer.—Comparative observations were conducted simultaneously at Kamptee and Muhtoor, from instruments placed in precisely similar circumstances at both places, namely, in an unoccupied Regulation European tent not shaded by trees. The highest point noted at Muhtoor was 98½°; at Kamptee 114½°;—lowest at Muhtoor 71°; at Kamptee 77°

Observations were also made every three hours, night and day, on an instrument kept in a small thatch-roofed hut, open to the winds, and from there the mean temperatures of the day and night, as noted on the sheet, are accurately deduced.

About 83° is thus found to represent the proper mean temperature of the locality during the period.

The daily range was calculated from the maximum and minimum markings of the instrument in the hut.

Hygrometer.—Kept in the tent—the average depression of the wet bulb instrument is from 2 or 3 observations at different periods of each day.

(Signed) R. WATSON,
Asst. Surg H. M.'s 91st Regt.

Memorandum by J. T. Maule Esquire, Deputy Inspector General of Hospitals, Nagpore Force.

In my annual report to the then Director General, Medical Department, dated 1855, I brought to notice the probably great advantages which might be derived by locating weakly men and convalescents of the British Troops stationed at Kamptee at some hill station in the neighbourhood, instead of sending them a distance of 7 or 800 miles in search of health, and strongly recommended the Chiculdah hills, from my own experience of the nature of the climate; but subsequently from representations made to me by the Reverend Mr. Hislop, Colonel Boileau, and others, I pointed out Muhtoor as a likely locality to conduce to this end.

On the formation of the Committee by order of Government in April last, to ascertain the advantages or otherwise of Muhtoor as a

Sanatarium, I was directed to accompany it, and assist the members with my opinion in their councils.

I am familiar with the report they now forward, and I desire to bear testimony to the care bestowed upon the subject, and my approval of the various points which have come under their consideration. Paragraphs 36 and 37 desire particular attention; while it would be highly advisable that the suggestion made in para. 30, should be, if possible, carried out.

Though I approved of the site for the proposed buildings, I desire to record my objections to the construction of them, as proposed by Captain Saunders.

In the plan submitted by that Officer, I consider them too wide apart from each other, and the whole of them verging too close to the brow of the hill. Instead of 150 feet they should be at least 100 yards on the descent: this appears a trivial matter, but may ultimately prove of consequence.

The last part of para. 51 is new to me, and I did not hear the subject mentioned while at Muhtoor, probably the Committee have been informed by the Civil authorities at Chindwara respecting the summit of the Muhtoor Ghaut being a place of veneration. Further enquiry on this point is necessary.

MILITARY DEPARTMENT,

Proceedings of the Madras Government.

Read the following: —

Memorandum from the Acting Quarter Master General of the Army, Fort St. George, 10th May 1860, No. 152, to the Secretary to Government, Military Department, Fort St. George, forwarded to Government with the Commander-in-Chief's request that the judicious arrangements Brigadier Carthew has ordered, may be sanctioned.

From Colonel A. BECHER, Quarter Master General of the Army, to the Secretary to the Government of India, Military Department,—(No. 1766, dated Camp Kheirrur, the 7th April 1860.)

I AM desired by His Excellency the Commander-in-Chief to transmit, for the information and orders of the Right Hon'ble the Governor General, the accompanying reports on the range of Puchmurry hills, with reference to their suitability as Sanataria for Europeans. And as every measure which is likely to benefit the health of European Troops and Officers in this country, is worthy of consideration, His Lordship would suggest that the Madras Government might with advantage be directed to make further experimental enquiries as to the fitness of the climate, &c., on the Table Land mentioned, for European convalescents or others.

From Surgeon J. C. GORDON, 4th Madras Light Cavalry, to Major ERSKINE, Commissioner, Saugor and Nerbudda Territories,—(dated Saugor, the 19th June 1856.)

IN reply to your letter of the 4th instant, I have the honor to tell you that I visited the Puchmurry hills in 1852, and in accordance with your request give you a few brief remarks on them.

The Mahadeo or Puchmurry range of hills averages on the Table Land somewhat more than 4000 feet above the sea, from observations by a very good and tried Aneroid barometer, and rise nearly 2300 feet from the level of the Deoganga or Deo Nalah, that skirts its southern face. The central portion of the hills is a level plateau with clumps of trees and single trees, very prettily interspersed through it. A few small eminences and hills usually partly wooded, occur throughout, especially towards the edges of the plateau; and as there are 3 or 4 lofty peaks that tower 700 or 800 feet above the level of the plateau, some small streams of running water intersect the Table Land: and from the first feature of the country I have no doubt that water would be found at no great depth any where throughout the range.

The village of Puchmurry is situated about 4 miles from the southern edge of the range; and the plain (I was informed) extended nearly as much more towards the north. The width of the plateau however is only on an average 2 to 3 miles.

The whole range is formed of sandstone of every degree of hardness, which would be an abundant and cheap building material; and there is abundance of various kinds of timber trees, among which the Sal tree is conspicuous. At the foot of the range I found a small seam of coal, of no value however, in the bed of the nalah, where the road crosses from Muhtoor, and the shales in contact with it abounded with the fossil remains of vegetables.

I was on the hills about the middle of April, and found the climate this season very delightful. The thermometer in a small Beechoba tent, under the shade of a tree, not exceeding 80° during the day, whilst at Bhowun at the foot of the hills it was nearly 100.°

My route from Kamptee to Puchmurry lay through Chindwara, Oomrait, Jamwye, and Muhtoor, as fully detailed by Major Snow. I found the Muhtoor range to be about 3,100 feet high, unlike the Puchmurry range. Its geological formation is entirely trap, which however appears to overlay the sandstone, for in one or two of the lowest level nalahs I found sandstone. The difficulties of this route over the Muhtoor range, can, however, be almost entirely obviated by the route mentioned in Mr. Medlicott's report, *viz.*, by the Goruck Pass. By this route I returned to Oomrait from Bhowun in 3 stages; *viz.*, Bore Nalah, Hurdghur, and Oomrait, and found the road over the range of hills both gradual and easy, both in the ascent and descent, and it only increases the distances by about 6 or 7 miles. I have no doubt myself that the Puchmurry range would form an excellent Sanatarium during the cold and hot seasons, as well to the residents in those territories as to those at Nagpore. I would not venture to say the same of it for the rainy months, as I fear its height is hardly sufficient to exempt it from fever, at least judging from the height required in *Southern* India, where 5,000 feet is considered as the lowest safe range. By a Sanatarium however, I do not mean to imply that it will prove a substitute for the hill ranges of the Neelgherries or the Himalayas (a prolonged trip to either of which has in many instances, saved the Indian valetudinarian a journey to Europe), but I mean that to the person in delicate health, to convalescents after any acute attack, and to those who without any specific complaint are suffering from impaired nervous energy, the effect of protracted residence in a tropical climate, it will prove highly advantageous, were it only to

save them from the exhausting and accumulating effect of every additional hot season, which even at Saugor is so trying to a delicate constitution.

I omitted to state, whilst on the subject of routes, that the Tara Ghaut by which I ascended, is at present with difficulty and indeed with danger, traversed by a sea horse; but I am of opinion that an inconsiderable expense would make it available for cattle in this point, agreeing with Mr. Medlicott in opposition to Major Snow's news.

From J. G. Medlicott, Esq., Assistant, Geological Survey, to Major Erskine, Commissioner, Saugor and Nerbudda Territories,—(dated Jubbulpore, the 2nd June 1856.).

You requested me to furnish you with every information I may have obtained on the subject of the climate, scenery, and roads of the Mahadeo or Puchmurry hills; and it seems to me that I shall be most likely to succeed in meeting your wishes, if you would permit me to offer some remarks in the form of appendix to the excellent report by Major Snow, which you were good enough to send for my perusal, and to the contents of which I shall, I fear, have little of any value to add.

Major Snow states that the Table Land on which the village of Puchmurry stands, is approached on the south by the Tara Pass, on the west by the Kori Pass, and on the north by the Pugara Pass; the two former being very steep and rugged, the latter a gentle slope. To commence with this last, if a traveller coming along the Trunk Road of the Nerbudda valley, east from Hoshungabad or west from Nussingpore, turns off to the south at a place called Bunkeree about half way between the two stations, he will find a large village called Futtehpore at the foot of the outer range of those hills which bound the great valley on the south all along its course. A pass in this outer range (at the mouth of which pass Futtehpore stands) leads into the valley of the Dermoa or Deo river, just here, parallel to that of the Nerbudda; crossing this valley in a south-west direction, a road leads to a village called Matkoolie, which is about 15 miles from Futtehpore, and near which is the foot of the Pugara Pass mentioned above.

Along this route, *viz.*, from Bunkeree, through Futtehpore to Matkoolie, a line of carriage road might be traced, connecting the foot of the Pugara Ghaut with the Hoshungabad and Nursingpore road, and not exceeding (as nearly as I can state distances without having measured them) 20 miles in length, and with easy gradient throughout.

The path up the Pugara Ghaut itself, though steep in places, and in other respects as bad as it can well be, yet follows a line without greatly diverging, from which a carriage road may be laid out, a good slope obtained without, as I conceived, having to encounter difficulties greater than would be met in a similar undertaking in any ordinary hilly jungly country; and thus Puchmurry might be readily connected by a practicable carriage road, with the principal highway of the Nerbudda valley.

Major Snow states that Peesooa a village near Matkoolie and the foot of the Pugara Ghaut, is 40 miles from Hoshungabad and 60 from Nursingpore; and I presume his estimate of the distance is correct. Compared with this you will see that the line above suggested through Futtehpore, makes a considerable *detour*, especially if Hoshungabad is the place to be reached; but as it would be necessary to construct 100 miles of road, in order to bring the two stations within the abovementioned distance of Peesooa, *viz.*, 40 and 60 miles respectively, it may possibly be considered that the cross road through Futtehpore is likely to meet all the requirements of the case for the present at least.

The Khori Ghaut may I think, be altogether omitted in estimating the facilities of approach to Puchmurry; for although its position on the west of the plateau seems to mark it as the natural way towards Hoshungabad and Baitool, yet the very impracticable nature of the country below, towards the west, renders it improbable that any line of communication will ever be carried over any hills in that direction.

Not so with the third, the Tara Ghaut on the contrary, is likely to become a very important road, in the event of the Sanatarium being established at Puchmurry, for as Major Snow remarks, the travellers from Nagpore to Baitool, must, in order to get to the north side of the hills, *viz.*, to the Bugara Pass, make a very long *detour*, and by execrably bad roads. With regard to the difficulties of the Pass itself, although it would doubtless be costly and troublesome to make a

carriage road up this side of the hill, I believe that the present path may be so far improved as to become a tolerably good bridle road.

Major Snow gives two routes from the foot of this ghaut to the south.

1*st*. By Doosawanee, Pugara (Perlodeger) to Chindwara, or to Oomrait.

2*nd*. By south Muhtoor, Jamye to Oomrait: and he mentions a third by the Goruck Pass; this latter route would run thus :—

By south (up the Gorack Pass) to Kanglo, Hurriaghur to Oomrait.

On by south Kanglo, Jamye to Oomrait ;—and it presents this advantage over the other two, namely, that it crosses in a depression of the Doosawanee and Muhtoor range, the highest point passed over being about 400 feet lower than either of those villages: even now this path is no where very steep. Easily practicable inclines might easily be obtained, and those difficulties of construction which Major Snow justly represents on the Doosawanee and on the Muhtoor line of roads, as so serious, altogether avoided.

Oomrait is I believe accessible from Nagpore, Chindwara at Baitool, and it may be connected with the foot of the Tara Pass by the line just described. Travellers from this side must however for some time at least be contented to climb to the new Sanatarium by a road similar to those which are still the only approaches to several of the hill stations at the Himalaya.

Reached then by either of these lines of road, from the north or from the south, the plateau presents a most agreeable aspect, which Major Snow aptly compares to that of an English park: its gentle undulations are covered with green sward, prettily varied by scattered clumps of trees and water, and by clear running streams. Three principal peaks rise to the height of about 700 feet above the Table Land; two on the south called Chadinghur and Mahadeo, respectively, and one on the west called Deogurh. Their rugged outlines and grey rocks form a striking and most picturesque feature in the landscape, and add greatly to its massy beauties. Of this park-like ground there are about 10 or 12 square miles,—nor is this the whole of the area available for building on, for several spurs or half detached hills projecting like

promontories from the main mass offer some most picturesque sites for a Bungalow; and towards the north side also, where the massing is intersected by ravines, and begins to slope down towards the valley of the Dainwah, the limit of good building ground may be still further extended.

There is much in the position and much in the scenery of Puchmurry to make it as a residence for the hot months, most inviting to Europeans living in Nagpore and the Nerbudda stations; but considered as a Sanatarium some other element must be taken into the estimate of the advantages which it may offer, and first of all climate.

Having remained on the hill for three days, I must beg to deprecate, though I did of being supposed *ex cathedra*, or even to offer my remarks on this subject as really trustworthy evidence. This premised, it seems to me when I look at the question *a priori*, that the actual elevation above the sea (be a little under 4,000 feet) is insufficient of itself to warrant the conclusion that the climate will necessarily be such as to offer any great sanatory advantages.

There are no doubt conditions under which 4,000 feet of elevation causes a very well marked change of climate. A hill rising at once to that height from a plain not itself greatly above the sea level, may have a climate offering such advantages; probably also the proximity of great mountain masses exert a powerful influence on the climate of lower ground in their neighbourhood. At Puchmurry no such conditions are realized, the little plateau lies high in the culminating map of a long and comparatively low range, none of whose highest peaks attain 5,000 feet of elevation. 2,000 feet may, I think, fairly be taken (as Major Snow states) for the difference between the general average elevation of the country from which it rises, and that of the little Table Land itself; but there are very considerable masses of high ground not far off, which rise to within a few hundred feet of the Puchmurry level, and consequently above that general average.

These conditions, I believe, to be unfavorable to the probability of the climate of Puchmurry being found to offer such marked contrast to that of the plain below, as will confer on the place any real advantages as a Sanatarium.

I venture to offer these suggestions, because their effect on my mind has been a conviction that the climate of Puchmurry will be found on the contrary to resemble closely that of Saugor or Jubbulpore, with probably a few degrees more cold in the cold weather, a colder morning throughout the year, a few inches more rain during the monsoon, and perhaps a few more showers during the dry months, difference which though very pleasant, I believe not to be sufficiently strongly marked to exert a very powerful or very rapid effect in an exhausted and impaired European constitution. To refute this opinion, or to confirm it, there must be placed in the hands of an experienced physician a meteorological register carefully kept on the spot for one year. Nothing short of this will, I believe, furnish solid data for a sound judgment on the climate of the place.

In conclusion then, it is my belief that Puchmurry can be easily approached, or that its approaches may be easily improved, so as to render it readily accessible both from the north and the south; that the position of the plateau among the hills, its scenery, and that of the surrounding valleys, render the place desirable as a residence; but that I hesitate to conclude or rather hold it rash to assume that its climate fits it for a Sanatarium.

From Major R. T. Snow, Deputy Commissioner, to G. H. C. Plowden, Esq., Commissioner at Nagpore,—(No. 30, dated Chindwara, the 23rd April 1856.)

No. 12, dated 12th April 1856.

I have the honor to acknowledge the receipt of the letter noted in the margin, requesting a report on my late journey to the Mahadeo hills, and on the fair held in their neighbourhood.

2. The Mahadeo hills are situated as the crow flies, about 45 miles north-east of Chindwara, but the shortest route must make the travelling distance about 10 or 12 miles more.

3. They consist of a clump of hills rising almost perpendicularly out of a plain, which must be on about the same level as the town of Chindwara, but from which latter they are separated by a lofty range of hills running east and west, very nearly as high as the Table Lands of the Mahadeo clump, on which the small Jagheer of Puchmurry is situated.

This Table Land is of very difficult natural access on all sides. The ascent from the south-east on the point nearest the Chindwara, is by a pass known as the Tara Ghaut, which does not admit of the passage of beasts of burthen. Horses can surmount it, but in some places it is extremely difficult and hazardous for them. I ascended and descended by this route myself on foot, and do not think it will be possible to make it available for laden cattle. On surmounting what appears from the plain below to be the general summit of the range, the track or path runs for about a mile almost on a level, till it reaches a high peak called *par excellence* the Mahadeo peak, when it slightly descends for a short distance into a small area or basin, at the extremity of which is situated the cave of Mahadeo, which extends for a considerable distance underneath the peak of the same name, and from which flows a small stream of water, which running through the centre of the basin descends into the plain below, whence it circles round the base of the clump to the eastward and northward under the name of the river "Dymva." From this spot the path again rises, but is of easier ascent than the first portion of the ghaut, and after about half a mile of level on its summit, again descends by a steep path, known as the Kowrull Ghaut, on to the plain on which the village of Puchmurry stands, at a distance of about 5 miles beyond the Mahadeo cave, and on about the same level. The plain around the village, as far as the eye can reach, is totally different from the usual scenery of this country, having more the appearance of a large English park, consisting of level grass plains, interspersed with large trees, and clumps of wood. It is by no means extensive, probably not exceeding 4 miles in breadth in any direction. I made no stay there myself, but I have learned from others who have visited the spot, that it retains its green and fresh appearance throughout the year; a fortnight seldom passing without a shower or two of rain. I took no thermometer up with me, so I am unable to do more than guess at the temperature by comparison with what it was below. The time was early in the month of March, and the thermometer in the valley beneath the hills (some 2,000 feet lower than Puchmurry) ranged at daylight in the open air from 42° to 54°, (only reaching the highest point one morning when the air was loaded with heavy thunder clouds) and ranging in a tent in the open plain at the hottest period of the day from 90° to 93°. The heat at Puchmurry would probably be at the same time some 5 or 6 degrees less at daylight, and probably from 8 to 10 at midnight.

4. I have no doubt whatever that the climate of this favored spot is admirably calculated to fit it for a Sanatarium, and place of resort in the hot season for persons living in other parts of the Nagpore territories, or i the valley of the Nerbudda. To the stations in which latter region it is much more accessible than from Nagpore, as I shall presently show.

5. The other ghauts or passes leading to Puchmurry are the Khori Ghaut on the south-west face, and the Pugara Ghaut on the northern; the former is said to be practicable for laden cattle, and is accessible from Hoshungabad and Baitool, but the latter is by far the the easiest, and from all accounts the only one by which beasts *heavily* laden could ascend.

6. My route from Chindwara to foot of the Tara Ghaut was as follows:—

1st. Jummoneah about 11 miles, through a level country, covered nearly throughout with jungle, except in the immediate neighbourhood of such villages as are situated on the road.

The road is crossed by the Kolbira river and several minor streams, but in other respects presents no obstacles to the formation of a pucka road.

2nd. Oomrait about 7 miles—the remarks on the former stage apply to this.

3rd. Budhwara about 8 miles—the route is through jungle the whole way. There are several rises and falls in the ground, but no obstacles of consequence to the formation of a good road. In the hills to the northward of this stage from Meyaree close to Budhwara, coal is found. At Meyaree there is a hollow under the hill, where it is said to be frequently found on fire.

4th. Foot of a range of hills about 1½ miles north of Jamye about 7 miles—there are one or two small ghauts on this stage, but nothing of any difficulty; the road is through jungle all the way, except immediately about Jamye, and very strong.

5th. Muhtoor—about 8 miles there is a long steep and difficult rocky ghaut at the very commencement of this stage, with one or two other considerable ascents and descents leading eventually to the top of

a range of hills running east and west, on which Muhtoor is situated. The road though very bad is practicable for camels and other beasts of burthen; but no wheeled conveyance can come further than the halting place at the foot. The road is stony and through jungle nearly the whole way. About Muhtoor the country is more open, with numerous small hills partially clothed with jungle, and large ravines, in one of which the "Pench" takes its rise. This land is very high and must be on the same level as Puchmurry. Muhtoor was once a flourishing village, but the proprietor, a relative of one of the numerous Jagheerdars in this region, was a few years since imprisoned at Nagpore for 2 years, in consequence of a murder occurring on his estate, the perpetrators of which he either could or would not produce. The estate was left to take care of itself, and there are now only 3 or 4 miserable huts, where there was once a respectable village. About ½ a mile beyond it, is the northern face of the range on which it is situated, and from the edge of which the Mahadeo clump is seen rising apparently like a gigantic wall out of the valley here, about 7 miles wide, which lies between.

6th. From this I ascended by the Muhtoor ghaut to a small open patch in the jungle about half way to the foot of the Tara Ghaut, some 6 miles, known by the name of Urjoon Khoond, from a natural reservoir of water found in the sandstone bed of a nalah by the action of the stream in the rainy season, and not far from a small village called Joukh, situated on the lower slopes of the Muhtoor range—a short march, but from the difficulty of the descent in many places, quite long enough for laden cattle. The whole of the valley here is covered with tiers of smaller hills, the paths over which are difficult in many places, but insignificant in comparison with those over the neighbouring ranges.

7. The next stage is about 7 miles to the spot, on which those attending the mela, which is held annually on the occurrence of the Sheboratree festival, assemble; it is a clearing in the jungle bordered by the Dainwah, a stream of beatiful clear water, which, as mentioned above, takes its rise in the Mahadeo cave; it is distant from the foot of the Tara Ghaut about 3 miles, and is known by the name of Bhowun. I have mentioned above the range of hills lying between Jamye and this valley, a plain to reach the Mahadeo from the Nagpore side: this range *must* be passed at one point or another. On its Muhtoor face there

are 3 ghauts which lead into the valley separating it from the Mahadeo. The "Muhtoor" by which I descended the "Goruck Ghaut," a few miles further to the westward, and the "Doosawance" some 14 or 15 miles to the eastward: of the first named pass, the two former lead to the Tara Ghaut, the latter to a road running through the valley in a northerly direction to the eastward of the Mahadeo clump, turning at Mowaljeer to the westward, and leading thence viâ Peesooa, Baikhera, and Pugara, by the ghaut of that name to Puchmurry. This road is practicable throughout for beasts of burthen, and its only objection is its being so circuitous. From Pugara Ghaut there are direct and practicable roads to both Hoshungabad and Nursingpore; the former place being distant as the crow flies about 40 miles, and the latter 60. On returning from the mela, I re-ascended the intermediate range mentioned above by the Doosawanee Ghaut, a pass of considerable length and difficulty, but not so difficult as that of "Muhtoor."

8. From Doosawanee, which is situated about a mile from the summit of the Ghaut being its name, I marched in a south-easterly direction through the hills, with here and there a slight (comparative) ascent or descent, and frequently along the course of what in the rains is a mountain torrent to Pugara, the principal village of the Jagheerdaree of Pertabgurh, a stage of about 13 or 14 miles. From Pugura* the descent to Chindwara is hardly perceptible, and the main body of the range by this route is left to the northward, the path running gradually rather through than over the southern slopes of the range, without meeting with any abrupt or difficult ghauts. From Pugara the route passes to Dalta on the southern bank of the Pench river, from whence Chindwara is distant about 18 miles.

9. There is another route from Doosawanee to Chindwara by a ghaut known as that of Eklaira, leading in the direction of Oomrait, but it is stated to be more difficult than that leading from Jamye to Muhtoor.

10. The direct road from Nagpore to these hills, after surmounting the ghaut leading from the low-lands of Mohgaon to the Chindwara plateau, also called the Tara Ghaut, would pass thence by Mahkair to Oomrait, and thence onwards as I have described to the foot of the

* Note.—A different Pugara from the one before mentioned (Sd.) G. P., Commissioner.

Tara Ghaut in the Mahadeo range, or if it should be found impracticable to render this ascent available for general purposes as far as Muhtoor, on the route described above, and thence descending by the Doosawanee Ghaut northward, through the valley to the eastward of the Mahadeo clump by Delakaree, Seetadongree, Bajeepanee, and Mowaljeer, where turning to the west, the road as before described ascends from Peesooa through Pugara to the Puchmurry plain. By this circuitous route 60 odd miles would be added to the journey, making it from Chindwara near 120 miles.

11. The other route from Chindwara to Doosawanee viâ Dalla and Pugara (Pertabgurh) would be about 46 miles, and thence by Peesooa and the Pugara Ghaut about 60 miles, more by the latter route, therefore the distance of Puchmurry from Chindwara would be nearly doubled. Peesooa at the foot of this ghaut is only distant from Nursingpore about 60 miles, and from Hoshungabad about 40. It is by this route, however, I fear, that all heavy baggage will have to proceed, unless the difficulties of the Tara Ghaut can be more easily surmounted than I anticipate.

12. From the top of the Ghaut between Nagpore and Chindwara to Oomrait viâ Mohkair, is from 28 to 30 miles—making the distance to the foot of the Tara Ghaut of the Mahadeo hills from thence, about 68 miles,—by going round by Chindwara this distance would be increased by 8 miles.

13. There is abundance of material for road-making along the whole route, which would reduce the ordinary cost of such a work considerably; but then again, the water courses crossing the route, and the ghats, are numerous; and I do not think less than 3,000 Rupees per mile could be calculated on as the probable cost of the entire line.

14. The period within which such a work could be executed, would of course depend much upon the energy of the Officer in charge, and the amount of supervision at his disposal; but from my knowledge of the usual delays that attend works of this nature in this country, I should not expect to see it completed under 3 years.

15. The fair or mela of Dhowaljeer Purbut, held at the foot of the Tara Ghaut in the valley at the base of the Mahadeo range, is an annual assemblage of Hindoos, who come from all parts at the period of the

Sheboratree festival to make their offerings to Mahadeo, and bathe at the source of the stream which flows though the cave of that name.

Those coming from the Nagpore country, or Berar, or from Nursingpore, Jubbulpore, and the north-east generally, assemble at the spot formerly indicated as known by the name of Bhowun. The fair is attended also by traders of all descriptions from Jubbulpore, Nursingpore, Hoshungabad, Nagpore, Bhundara, Chandah, and Chindwara, and who erect their convas stalls on either side of the pathway leading through the open space, the remainder of which is filled by the temporary grass huts of the pilgrims, which are prepared and sold by speculators who come to the spot several days before; for this purpose, and usually reap a handsome reward for their labour.

16. There is also a large gathering of pilgrims as well as traders, in the area in which the cave is situated, composed principally of persons coming from the north and west, who reach it by the Pugara and Roree Ghauts. The number collected on the two spots at one time could not have been less than 14 or 15,000 souls, who began assembling on the 1st March, and finally broke up on the 8th. In spite of their numbers they were very orderly, and not a single case of theft took place during the whole period of their stay, nor, as far as I have heard, during their progress to and fro.

17. The object as has been stated of the assemblage, is to pay their devotions to the cave of Mahadeo, where offerings are made to the supposed deity, according to the means of the several parties. These offerings though made in the name of, and to propitiate Mahadeo, are taken on alternate years by the Thakoors or Jagheerdars of Puchmurry, Baikhera, and Pugara, who are the hereditary Bhopas or chief priests of this temple. It is difficult to account for the blind infatuation which leads the pilgrim to this shrine, year after year, to make his offering, propitiatory of the presiding deity, knowing that it is appropriated by these Thakoors to their own individual benefit. In this indeed, there is no subterfuge. This year the collection of these offerings fell to the Thakoor of Puchmurry, who day and night, during the six days through which the offerings were continued, remained himself seated on a rock at the upper extremity of the cave, personally collecting the amounts offerred up in cash, while his mother on a neighbour-

ing seat collected those made in kind. Their seats are surrounded with water, through which, about 3 feet, the pilgrims have to advance, and in which after making their offerings, they dip themselves and wash away whatever sins they may have been previously burthened with. In future years the number of pilgrims will probably be considerably increased, as the tax heretofore levied on them, prevented many from coming. This year the intelligence of the tax having been discontinued, was scarcely promulgated early enough to reach all parts of the country ; but the actual fact of its discontinuance will now be spread far and wide by those who attended on this occasion.

18. I must apologize for the length of this letter, which I hope will convey the information sought for, though I fear it is a production of rather a rambling nature.

From Brigadier F. WHELER, Commanding Saugor District, to the Quarter Master General of the Army, Head Quarters,—(No. 346, dated Saugor, the 26th March 1860.)

SINCE Saugor and Jubbulpore have became stations for European Soldiers, I think the Right Hon'ble the Commander-in-Chief will be glad to receive reports on the Puchmurry hills, which might probably be found adapted for a Sanatarium.

These reports are from Doctor Gordon, Madras Cavalry, and Mr. Medlicott of the Geological Survey, and Major Snow, late Deputy Commissioner, Chindwara.

Lord Clyde will observe, that these gentlemen report on the very agreeable climate and beautiful appearance of those hills, but give no decided opinion as to their being adapted to a Sanatarium.

From all accounts I gather that a practicable road could be made at small expense from Futtehpore to the north side of the hills, but that there would be great difficulty from the south or Nagpore side.

By the road, Jubbulpore would be about 125 miles from Puchmurry.

Saugor by a bad road down the Silwanny Ghaut to the Nurbudda, would be about 115 miles from the Sanatarium, and along the high road viâ Kirpanee Ghaut near Nursingpore, about 135 miles.

The advantage of having a Sanatarium near at hand for the Force in Central India is so obvious that I will not enter on that subject, but will merely urge His Lordship to confer a boon on us by soliciting the Government to send some scientific man to report on the climate for one year, and to try the station of Puchmurry with a few men the next hot season, if the report be favorable.

In conclusion I would beg to say that these reports sent at my request by Major Erskine, were before the Lieutenant Governor, North West Provinces, in 1856.

(True copies)

(Signed) F. D. ATKINSON, *Major,*
Offg. Secy. to the Govt. of India.

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